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No. 3161.—VOL. LXVI.

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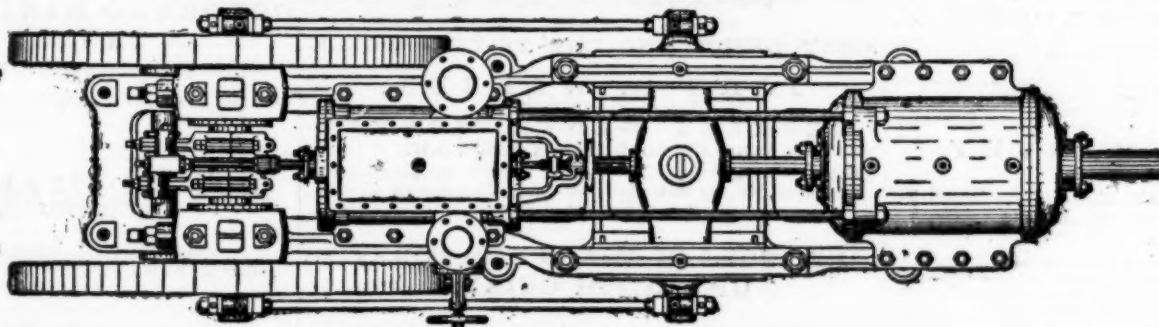
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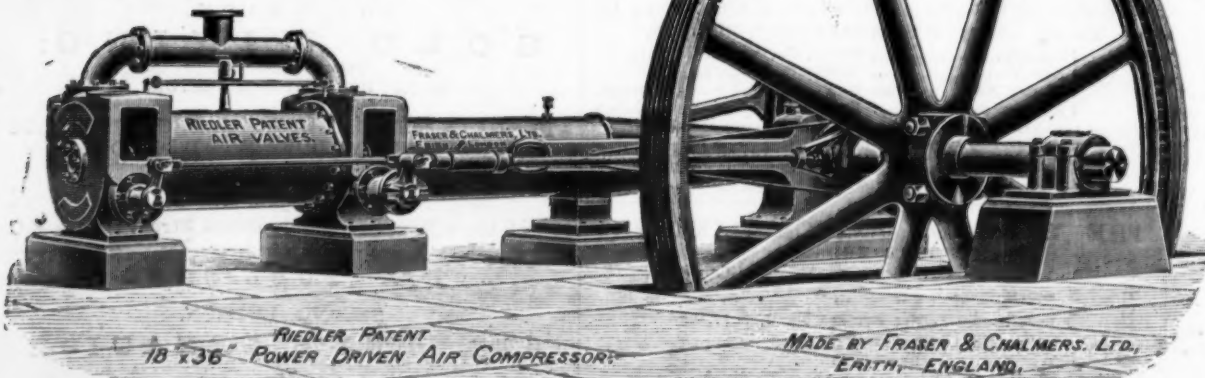


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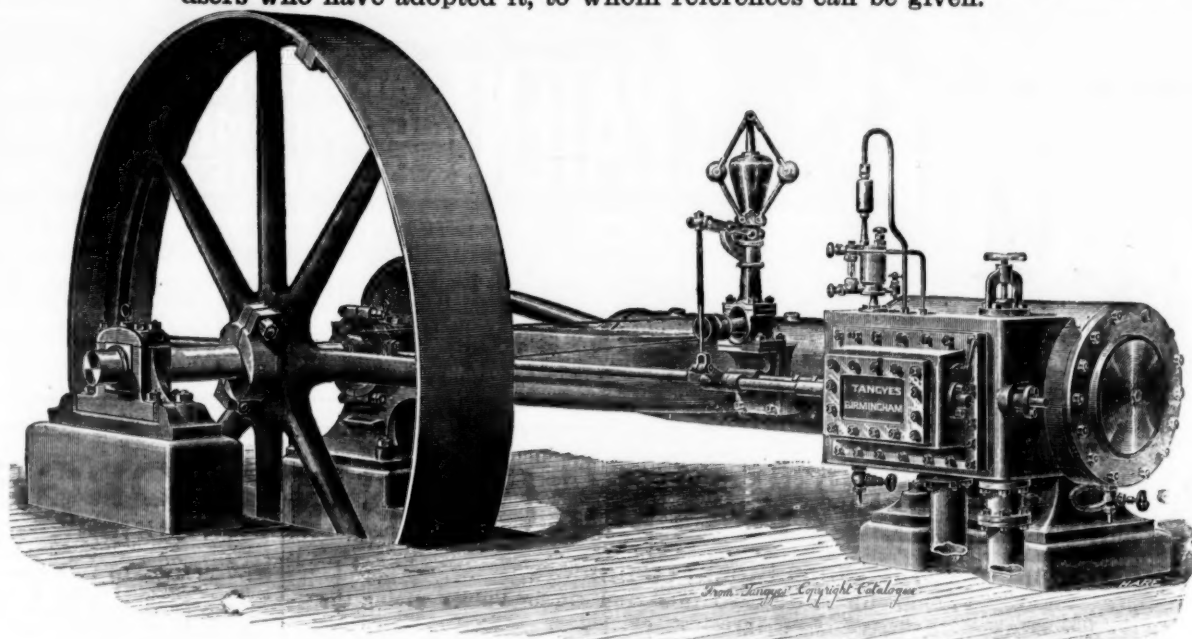
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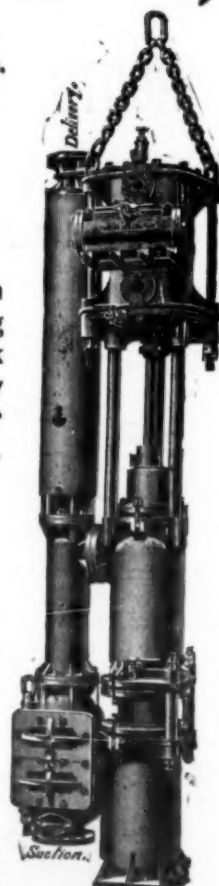
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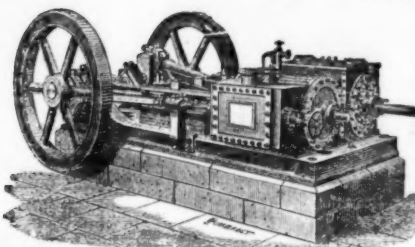
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2, Metal Exchange Buildings, Leadenhall Avenue.

**LONDON, E.C.**

AGENTS FOR THE BRITISH ALUMINIUM COMPANY, LIMITED.

## A. & J. STEWART and CLYDESDALE, Limited.

Glasgow, Coatbridge, and Mossend.

WROUGHT IRON WELDED TUBES and FITTINGS for GAS, WATER, and STEAM.

Light Lap-welded Wrought-iron and Steel Tubes

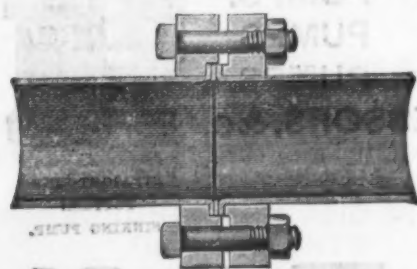
(SPECIALLY ADAPTED FOR MINES).

With Patent Flanged Joints (as illustrated) for the Conveyance of Water, Steam, and Air, at High and Low Pressures.

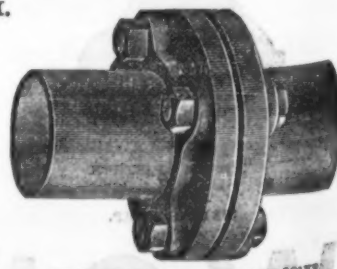
LAP-WELDED IRON AND STEEL BOILER TUBES

FOR LOCOMOTIVE, MARINE, AND OTHER MULTITUBULAR BOILERS.

### STEEL & IRON PLATES FOR BOILERS, BRIDGES, &c.



SECTION OF PATENT FLANGED JOINT



PLAN OF PATENT FLANGED JOINT

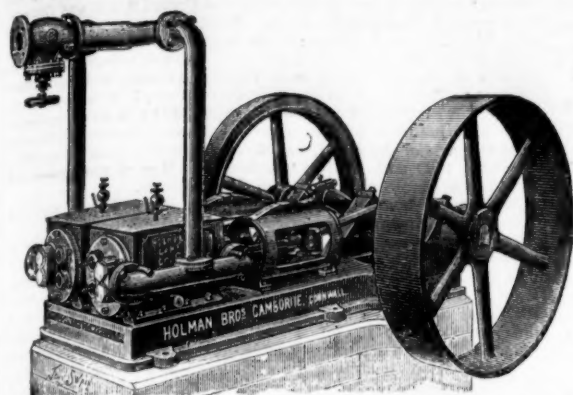
Head Offices: **41, OSWALD STREET, GLASGOW.**



# HOLMAN Bros., Camborne, Cornwall.

ESTABLISHED 1839.

Patentees and Sole Makers of  
"THE CORNISH" ROCK DRILL and "THE CORNISH" COMPRESSOR.



FIRST  
SILVER MEDAL,  
Highest Award,  
Mining Institute  
Contest, 1881.



FIRST  
SILVER MEDAL  
Highest Award,  
Royal Cornwall  
Polytechnic  
Jubilee Exhibition  
Contest, 1882.

Three Makers  
represented.

Five Makers  
represented.

AWARDED SILVER MEDAL INTERNATIONAL  
INVENTIONS EXHIBITION, 1885.

## RECORD OF WORK DONE

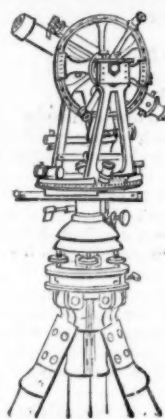
At Botallack Mine, St. Just, Cornwall, **TWELVE MEN** with **TWO** new Patent **CORNISH ROCK DRILLS** drove, sunk, and rose **288 FATHOMS** in **12 MONTHS**, equal to five times the Speed of Hand Labour  
At Wheal Grenville Mine, Camborne, Cornwall, **SIX MEN** with **TWO** new Patent **CORNISH ROCK DRILLS** started from the **150 FATHOMS** level and put up in **EIGHT MONTHS** a **11 FEET** by **5 FEET PERPENDICULAR RISE 46 FATHOMS 5 FEET 6 INCHES**, and about midway drove **1 FATHOM 5 FT.** No communication of any kind was effected until holing to the Shaft brought down from surface.

Estimates for **ROCK BORING PLANT** and **GENERAL MINING MACHINERY**  
on Application.

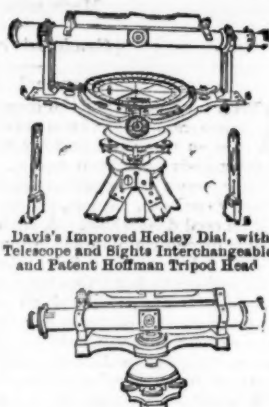
London Offices: 7 and 9, LEADENHALL BUILDINGS, E.C.

# JOHN DAVIS AND SON,

ALL SAINTS WORKS, DERBY;  
118, NEWGATE STREET, LONDON.



Transit Theodolite with Patent  
Hoffman Tripod Head, and  
Trough Compass.



Dumpy Level with  
Hoffman Patent Tripod Head.

**MINING, SURVEYING, AND  
ENGINEERING INSTRUMENTS**  
**THEODOLITES. LEVELS. TACHEOMETERS.**

Davis's Improved Hedley Miners' Dials, with  
**HOFFMAN PATENT TRIPOD HEAD;**  
AND ALL DESCRIPTIONS OF MATHEMATICAL AND  
MINING SURVEYING INSTRUMENTS.

Revised Illustrated Catalogues Free to any Part of the World.  
SECTION (A) MATHEMATICAL DEPARTMENT AND SAFETY LAMPS  
SECTION (B) ELECTRICAL DEPARTMENT.

Gold Medal Awarded Mining Exhibition, 1890.  
A. B. C. CABLE CODE, 4th EDITION.

**AWARDS:** CRYSTAL PALACE, 1890; TASMANIA, 1891; KIMBERLEY, 1892.

# CONCENTRATION.

The Clarkson-Stanfield Ore Reduction Co. (Limited).

In the CLARKSON-STANFIELD process of Concentrating Refractory and Complex Ores no water is required; dust is reduced to a minimum; the loss of Mineral through water-borne Slimes is obviated.

**OUTPUT  $\frac{1}{2}$  TO 2 TONS PER HOUR, ACCORDING TO SIZE OF MACHINE.**

CONCENTRATOR TO BE SEEN IN OPERATION AT THE COMPANY'S ONLY ADDRESS.

**6, COLONIAL AVENUE, MINORIES, LONDON, E.**

The Machine is superior to Sieves for Sizing Homogeneous Substances, such as Emery, Sand, and Powders, and may be used to great advantage in the preparation of Ochre.

N.B.—The owners of the Carndochan Mine, near Bala, North Wales, will, by arrangement, show their CLARKSON-STANFIELD plant working on a Refractory Low Grade Gold Ore.

## NEW PATENTS.

LIST of APPLICATIONS for New Patents relating to Mining Metallurgical, Engineering, Railway and kindred matters, specially compiled from official sources for the "Mining Journal" by Messrs. Rayner and Company, Patent Agents, 37, Chancery Lane, London, W.C., who will forward all information regarding them free on application.

- 4054 Joseph William Reed, 3, St. Nicholas Buildings, Newcastle-on-Tyne.—Improvements relating to steam generators.—March 2.
- 4057 Francis Frederick Barnes and Francis Champell, 193, Creek Road, Deptford, London.—Soldering of aluminium or metal alloyed with aluminium.—March 7.
- 4070 Louis Mannstaedt, Barmer, Germany.—Improved method of producing ornamental, hollow, or massive or torsion columns, with moulding all round of rolled bar iron.—March 2.
- 4073 Jan Demucien, 46, Lincoln's Inn Fields, London.—Improvement in the method and apparatus for preventing accumulation of deposits in steam generators.—March 2.
- 4081 Wilhelm Schmidt, 12, Cherry Street, Birmingham.—Improvements in and connected with combined steam-engines and steam generators.—March 8.
- 4091 William Swan Stallybrass and William Lewis, 22, Southampton Buildings, Chancery Lane, London.—An automatic valve sprinkler for colliers.—March 2.
- 4092 Thomas Parker and John Pullman, 65, Chancery Lane, London.—Improvements in the treatment of sulphide ores.—March 6.
- 4118 Herbert Charles Bath Forester, 47, Lincoln's Inn Fields, London.—Improvements in apparatus for the production of consolidated fuel from fine coal or coal dust.—March 6.
- 4126 Frederick Tremlett, 2, John Street, Bristol.—A multiple stamping hammer.—March 7.
- 4131 William John Fieldhouse, 24, Temple Row, Birmingham.—Improvements in drive chain.—March 7.
- 4139 John Samuel Booth, 33, Chancery Lane, London.—Improvements in or connected with apparatus for superheating steam.—March 7.
- 4170 Thomas Marsden, 6, Lord Street, Liverpool.—Improvements in apparatus for preventing (apparatus) accidents from over winding of the cages of mine shafts.—March 7.
- 4194 George Pearce Lewis and Frederick Southwell Cripps, 6, Bream's Buildings, Chancery Lane, London.—Improved means for recovering cyanide from waste product in gas, chemical, and iron works.—March 7.
- 4199 Reginald Tom Marshall and Leonard George Attenborough, 323, High Holborn, London.—Improvements in or relating to the precipitation of precious metals from their solutions.—March 7.
- 4198 John Henry Richard, 48, Lincoln's Inn Fields, London.—Improvements in oil, gas, and like explosive motors.—March 7.
- 4208 George Goeft and Julius Schenbutter, Queen Victoria Street, London.—A combination steam boiler.—March 7.
- 4209 Carl Felsky, 46, Southampton Buildings, Chancery Lane, London.—Improvements relating to steam generators.—March 7.
- 4217 Alfred Thomas Thorneycroft.—Improved valve or faucet.—March 7.
- 4241 Nicola de Gester.—Oblique end rail.—March 7.
- 4249 Richard Van Wicke.—Improvement in coaches.—March 7.

## SPECIFICATIONS PUBLISHED.

4155 Githoe, steam generator, 1895; 4333, Hughes, drilling machines, 1895; 4442, Hawes, steam engines, 1895; 7359, Eveitt, steam generators, 1895; 7410, Mosely, collier conveyer tube, &c., 1895; 7867, Fisch, girder framework for mine, 1895; 74, 801, Bayle, steam engine governors, 1895; 749, Taylor, rock drill, 1895; Pennigton, explosion engine, 1895; Reynold, horse shoes, 1895. The above specifications published may be had of Messrs. Rayner and Co., 37, Chancery Lane, London, at 10s. each, including postage.

THE MURCHISON GOLD FIELDS (LIMITED) have acquired a lease of 24 acres in the Hannan's district south of the Great Boulder, which is highly recommended by Captain W. Oats, and certified by him to carry a lode 30 feet wide.

## JOINT-STOCK COMPANIES.

### NEW REGISTRATIONS.

THE following are among the joint-stock companies registered at Somerset House since our last notice:—

Stonehams and Wethereds (Limited).—Registered March 2 by W. Neely, 1, George Street, Mansion House, E.C. with a capital of £100,000, divided into 100,000 shares of £1 each. Object: To construct, execute, equip, carry out, improve, work, develop, administer, and control any railways, tramroads, quays, docks, harbours, piers, wharves, canals, reservoirs, embankments, sewage, drainage and general sanitary works, and to carry on in all or any of their respective branches the businesses of miners and smelters, metallurgists, builders, contractors, farmers, merchants, carriers, shipowners, warehousemen, forwarding agents, bankers, capitalists, concessionaires, &c.  
Rhodesian Pioneers (Limited).—Registered March 5 by Steadman, Van Praagh and Co., 23, Old Broad Street, E.C. Capital £200,000, divided into 200,000 shares of £1 each. Object: To adopt and carry into effect an agreement (referred to in Clause 2 of the company's Articles of Association) made March 2 between C. G. Glass and the Rhodesian Venture Syndicate (Limited) of the one part, and E. E. Collins, on behalf of this company, of the other part; to acquire any farms, lands, estates, mines, mining, water, and other rights, grants, leases, claims, concessions, options of purchase, and other property in Matabeleland or elsewhere; to search for, prospect, examine, and explore any territories and places in Matabeleland or elsewhere, and to carry on the business of a mining, milling, smelting, and metallurgical company in all its branches. The first directors—of whom there shall be not less than three nor more than seven—are to be elected by the signatories. Qualification, 100 shares. Remuneration, £100 per annum each, and a percentage of the profits (the latter being divisible; Chairman, £200. Registered office, Winchester House, E.C.  
Jumpers Reef, Matabeleland (Limited).—Registered March 5 by J. B. Roberts and Wrightson, 73, Basinghall Street, E.C. Capital, £75,000, divided into 75,000 shares of £1 each. Object: To acquire certain mining claims, mines, mining, water, and other rights, grants, leases, concessions of purchase, farms, estates, lands, mineral deposits, and other property at Jumpers Reef, Bulawayo, Matabeleland, British South Africa; to search for, prospect, examine, explore, and generally turn to account or deal with any mines and ground supposed to contain minerals or precious stones, and to carry on the business of a mining, milling, smelting, and metallurgical company in all or any of its branches. The first directors—of whom there shall be not less than three nor more than seven—are to be elected, three by the signatories, one by the Matabeleland Ancient Gold Reef (Limited), and one by the shareholders. Qualification, £100. Remuneration, £50 per annum each. Chairman, £75.  
Petroleum Distributing Company (Limited).—Registered March 9 by Parker, Garrett, and Parker, 81, Michal's Rectory, Cornhill, with a capital of £50,000, divided into 50,000 shares of £1 each. Object: To acquire by purchase or otherwise any lands, oil wells, refineries, mines, buildings, machinery, plant, &c., and to carry on the business of purchase, supply, and distribution of petroleum and its products; also to carry on business as bankers, capitalists, financiers, concessionaires, merchants, &c. The first directors—of whom there shall be not less than three nor more than seven—are to be elected by the signatories. Qualification £200. Remuneration to be fixed by the company.  
Williamson and Joseph (Limited).—Registered March 9 by M. Moseley, 303, Strand, with a capital of £10,000, in £1 shares, of which 5000 are 5 per cent. cumulative preference. Object: To enter into an agreement with E. L. Joseph, and to carry on the business of electrical engineers and electricians in all its branches. The directors are E. L. Joseph and two others. No qualification or remuneration specified.

Gullewa Gold Mines (Limited).—Registered March 9, by Morten, Cutler and Co., 99, Newgate Street, E.C. with a capital of £125,000, divided into 125,000 shares of £1 each. Object: To adopt and carry into effect an agreement expressed to be made between the Peninsula Exploration Company (Limited) of the one part and this company of the other part, for the acquisition by this company of certain mining leases or claims situate at Talgoon, in the Murchison district of West Australia, and to develop, work, and turn to account the same in such manner as the company shall see fit. The first directors—of whom there shall be not less than three nor more than seven—

are the Right Hon. Lord Clanmorris, A. Parke-Smith, W. E. Markwick, and S. H. Prell. Qualification of first directors, £200; of subsequent directors, £500. Remuneration, £50 per annum each and a percentage of the profits, divisible; Chairman, £100.

## CONTRACTS OPEN:

FOR MINE, QUARRY, RAILWAY, AND ENGINEERING WORK, STORES, &c.

\*We shall be obliged by being promptly placed in possession of particulars regarding contracts open for competition, and of the results of successful tenders. In the latter case contract prices should be given.

The date given is that by which tenders must be delivered, in nearly all cases further information can be obtained on application at the addresses given. In applying for such the name of "The Mining Journal" should be mentioned as the original source of the information, concerning which further particulars are required.

### HOME CONTRACTS.

Railway Widening, March 24 (Salford and Newton Heath).—For the following works for the Lancashire and Yorkshire Railway Company—viz., widening of railway between Deal Street and Windsor Bridge Junction, Salford, and erection of new buildings, three bridges, &c., in connection with the extension of the carriage works, Newton Heath. Plans and specifications may be seen, and quantities, with forms of tender, obtained on application at the Engineer's office. Tenders, endorsed for the respective works as the case may be, to be in the hands of Mr. O. W. Bayley, secretary, Hunt's Bank, Manchester, by 9 a.m. on 24th inst.

Railway Springs, March 26 (Lisbon).—For the supply of 400 railway springs, for the Royal Portuguese Railway Company. Particulars can be obtained from the Paris office of the company, Rue de Chateaudun 25. Tenders to the company's stores at Santa Apollonia, Lisbon.

Railway Stores, April 8 (Lisbon).—For the supply to the Royal Portuguese Railway Company of 250,000 kilograms of mineral oil, 2000 gauge-glasses, and sundry turntables (three tenders). Particulars can be obtained at the company's Paris office, 28, Rue de Chateaudun. Tenders to the chief engineer at the company's stores, Santa Apollonia, Lisbon.

AN AUSTRALIAN MINING MANUAL, compiled by Mr. G. B. Beaman, with the assistance of Messrs. F. C. Mathieson and Sons, and published by Mr. Effingham Wilson, of 11, Royal Exchange, E.C., has just made its appearance. It is intended to be a handy guide to the West Australian market, and admirably fulfils this object. It gives detailed particulars of all the West Australian companies, and shows at a glance what their capital is; the names of the secretaries and directors, the address of the London office, the objects of the company, the description of the property, and other essential particulars. It is accompanied by a map of the gold fields of Western Australia, which, of course, greatly enhances the value and usefulness of the work.

MINING MACHINERY.—It is very evident that dry crushing is at the present time attracting considerable attention, and is destined to come very much to the fore. For Western Australia this system is particularly suitable, although quartz rolls are being sent out to the Transvaal, New Zealand, and other countries. Messrs. J. J. Harvey and Co., 11, Queen Victoria-street, E.C., to whose machinery and illustrated catalogue we have before referred, have given this subject special attention, and are receiving numerous inquiries for their dry crushing plant.



## FLAMELESS EXPLOSIVES.

## THE COMMITTEE'S REPORT.

(Issued by the North of England Institute of Mining and Mechanical Engineers.)

(Concluded from page 330.)

## General Remarks.

THE proceedings of the committee are now concluded. Their programme has been carried out with every possible care, so as to ensure uniformity in the conditions under which each explosive has been tested.

Four series of experiments were made respectively in mixtures of coal gas, pit gas, pit gas with the addition of coal dust, and in coal dust alone. A fifth series was conducted with the object of determining the presence of flames arising from the safety explosives when fired into the atmosphere.

Experiments have also been made with detonators.

In four series, referred to above, a maximum number of experiments was previously determined upon. These were carefully carried through until the explosive caused the ignition of the mixture into which it had been fired, when further experiments with that explosive were discontinued.

By such a programme a comparison of the safety of the several explosives may in some degree be assumed. It must, however, be apparent that it would be injudicious to make a comparison of the reliability of these explosives, when actually employed in mining, upon such a basis as may be deduced, by taking the ratio of ignitions of mixtures to the total number of experiments.

With our present meagre knowledge of the reactions arising from the detonation of high explosives, we are apt to assume that there is an element of chance in some of the results obtained. For instance, an explosive may be fired 49 times into explosive gaseous mixtures, the conditions of each experiment being identical, without causing an ignition of the mixture; but an ignition may be caused by the next shot, which, had it been the first, would give a very different value to the series, for, instead of 2 per cent. of ignitions, there would be 100 per cent.

Many similar instances are recorded in the report of the proceedings, as is shown by the epitome of results recorded in Table XXI. of the experiment made by the committee.

This table affords strong and sufficient arguments against adopting a basis of safety formed by a comparison of the ratio of ignitions of mixtures caused by the several explosives. An explosive which once fails in the safety test is liable to fail again.

The results of the enquiry point very conclusively to the unreliability of all of the safety explosives; contrary to the general opinion at the time when these experiments were commenced, it is proved that no explosive is flameless, and that all are capable of igniting gaseous or coal dust mixtures.

Very interesting results have been obtained during the course of this enquiry. Firstly, the sensitiveness to ignition of coal gas, as compared with pit gas, has been clearly demonstrated. Secondly, the presence of flames in an explosive gaseous mixture has been proved, the flames sometimes being first observed at points several feet remote from the cannon without ignition of the gaseous mixture ensuing. The retarded ignitions of explosive mixtures of coal gas, and the point of first ignition of gas mixtures occurring many feet distant from the cannon, are interesting features in the enquiry.

Knowledge of this extensive subject—explosives—has only been obtained at the cost of much labour and expenditure from properly conducted experiments, and there still remains much to be done. Interesting results might be obtained by firing shots through a space containing atmospheric air into a chamber containing gas or coal dust mixtures. Many varieties of coal dust have not yet been tested, and little is known about the propagation of coal dust ignitions. By means of a constant current of air and coal dust many interesting experiments might be made, and much useful knowledge gained.

All the safety explosives ignited mixtures of coal gas, and consequently the experiments are not included in the following epitome of results. The experiments with coal dust *in situ* are also excluded, as none of the safety explosives ignited such mixtures.

**Bellite.**—No ignition occurred in the 45 experiments made in explosive mixtures of pit gas. There was one ignition in seven experiments made in mixtures of pit gas and coal dust; and there was one ignition in 20 experiments in coal dust in suspension. It is interesting to note that a stemmed shot ignited a pit gas and coal dust mixture, whereas, in pit gas alone, 25 unstemmed shots and 20 stemmed shots were fired without the mixture being ignited. Again, a coal dust mixture was ignited by the third shot, whilst one ignition occurred out of 52 shots fired into pit gas mixtures.

**Securite.**—There is nothing very remarkable in the results obtained with securite. When unstemmed, this explosive readily ignited a pit gas mixture and mixtures of coal dust in suspension.

**Ammonite.**—When unstemmed, ammonite ignited mixtures of pit gas and also pit gas mixtures.

**Roburite.**—This explosive failed to ignite mixtures of pit gas, mixtures of coal dust alone, and mixtures of pit gas and coal dust when the shots were stemmed, but it ignited the latter mixture when the shots were unstemmed. The interesting features are that with unstemmed shots 25 trials were made in pit gas without causing an ignition, and in pit gas and coal dust mixtures, an ignition occurred at the ninth shot. Roburite withstood a very severe test in coal dust in suspension, 52 experiments being made with unstemmed shots and 18 experiments with stemmed shots, and in no instance was the mixture ignited. Had it not been for the one ignition occurring in the pit gas and coal dust mixture this explosive would have had a good record.

**Carbonite.**—Very remarkable results were obtained from carbonite. Out of a total of 79 experiments made in mixtures of pit gas and pit gas and coal dust, it did not in a single case ignite the mixtures. Forty of these experiments were made with unstemmed shots, yet in a mixture of coal dust in suspension the first shot ignited the coal dust. This is the only instance of ignition throughout the experiments with carbonite, and it is curious that coal dust in suspension should have been ignited, when out of 79 experiments in gaseous mixtures no ignition occurred.

**Ardeer Powder.**—This explosive ignited a pit gas mixture with an unstemmed shot. In this single exception no ignition occurred throughout the series of experiments with ardeer powder. With 51 trials with coal dust in suspension it failed to ignite the dust. Had it not been for one ignition occurring in the pit gas mixture this explosive would have had a good record.

**Westfalit.**—Westfalit ignited a mixture of pit gas with an unstemmed shot, and an ignition of pit gas and coal dust mixture occurred with a stemmed shot. In no instance was a mixture of coal dust in suspension ignited by this explosive.

There are only two instances throughout the whole series of experiments (exclusive of those with coal gas) where a mixture was ignited by stemmed shots. These occurred with bellite and westfalit in explosive mixtures of pit gas and coal dust.

## Conclusions.

The lengthy series of experiments, which have occupied the attention of the committee since March, 1892, appear to establish the following conclusions:—

1. The high explosives (ammonite, ardeer powder, bellite, carbonite, roburite, securite, and westfalit) on detonation produce evident flame.

2. The high explosives are liable to ignite either inflammable mixtures of air and fire-damp—or air and coal dust—or air, fire-damp, and coal dust, and, therefore, cannot be relied upon as ensuring absolute safety when used in places where such mixtures are present.

3. The high explosives are less liable than blasting powder to ignite inflammable mixtures of air and fire-damp—air and coal dust—and air, fire-damp, and coal dust.

4. The experiments have shown that ignitions of mixtures of air and coal dust, with or without the presence of fire-damp, can be obtained when there is present a much smaller quantity of coal dust than has been previously supposed to be necessary.

5. It is essential that similar examinations of the working places and precautions which are in force in mines where blasting powder is used, should be rigidly observed where a high explosive is employed.

6. In selecting a high explosive for use in a mine, it should not be forgotten that the risk of explosion is only lessened, and not abolished by its use.

7. In view of the changes from time to time made in the proportions and constituents of high explosives, it is desirable that the name of the explosive should be printed on the wrapper of each cartridge, and that the date of manufacture and the proportion of the ingredients used in the manufacture of the explosive should be printed on the case of each packet of cartridges.

8.—As these explosives alter in character if improperly kept, it is necessary that every care should be taken in the storage to ensure their being maintained in good condition.

Finally, the committee desire to record their thanks, and those of the members of the North of England Institute of Mining and Mechanical Engineers to the Durham Coal Owners' Association; the Northumberland Coal Owners' Association; Mr. J. R. Carr-Ellison, Hedgesley; Messrs. Tangves (Limited); the Wallsend and Hebburn Coal Company (Limited); the South Shields Gas Company; Messrs. George Angus and Co. (Limited); Messrs. Bolekow, Vaughan, and Co. (Limited); the Union Engineering Company; the Grange Iron Company; Messrs. Nobel and Co. (Limited), &c., who have rendered valuable assistance in subscriptions, in use of premises, materials, &c., in connection with the experiments.

## JOHANNESBURG NOTES.

## MIDAS ESTATE.

The battery will start in a few weeks, and the profits per ton will show greater percentage than upon any other mine in Africa. Development shows over 100,000 tons of ore, the average assay being over 4 ounces, therefore at least 2 ounces should be obtained from the mill and cyanide. The mine shows considerable improvement in the lower levels.

## MIDDELVEIL.

The improvement shown in the Midas Estate affects the whole prospects of this property. The shares of this company are now very much below their actual value, and should command a much higher figure.

## MIDAS DEEP.

The rich chute in the Midas Estate dips into this property, and traverses through the whole of the claims.

## AFRIKANDER MINES.

The reef was met with at a depth of 500 feet, giving assays of 17 dwts., over 4 feet of ore. It is not improbable that an amalgamation with the Wolven and will eventually take place, and therefore the future prospects are certainly very promising.

## UNITED BULTFOONTEIN DIAMOND.

The average of 15 carats hitherto obtained should be kept up when extra washing plant is erected, and on this basis a profit of fully 20 per cent. is assured.

## YORK.

The opening up of this property has been conducted with great energy, the main shaft is down 800 feet on the incline, the levels are now being opened, a considerable part of the machinery and other plant is now arriving on the ground, and when erected the whole will be exceedingly compact. The value of the ore is very high, and when in full swing this property will give a good account of itself.

## LANGLAAGTE UNITED.

The main reef and leader has been picked up at a distance of 450 feet, the main reef being nearly 7 feet thick, and the leader 18 inches. It is expected that the south reef will shortly be intercepted. This mine has a good future.

## BUFFELSKLOOF.

Excellent work is being done on this block of claims. The development is being carried out systematically, and so far with very satisfactory results. It will be remembered that this property is situated on the big series with reefs identical to those being developed by the Rooderand Gold Mining Company.

## ROODERAND GOLD MINING COMPANY.

Work is being pushed ahead. The new drive is panning splendidly. In addition to this, another reef has been tested, giving exceedingly good panning. This company will prove a paying concern, and I look to Buffelskloof and Rooderand Companies to demonstrate the value of the big reefs of the Vaal River. This they have every facility for doing, with large bodies of reefs at their disposal, and exceptional facilities for cheap working. Shareholders who hold on to their shares, and exercise a certain amount of patience, are bound to get a big return later on.

## BRADBURY'S WORLD PATENT DRILL SHARPENER COMPANY (LIMITED).

Several new companies are now using these machines, the saving of labour being immense. Eventually they will be in use all over Africa. There is little doubt that this company will pay good dividends on the business being done in Africa alone, and when the machines come to be exhibited in other parts of the world, and the rights sold to companies formed to work them in other colonies and countries, the probabilities of this, the parent company, are very great, as it will hold a very large interest in all subsidiary companies formed.

## ORION.

The reef has pinched out; mine shut down in consequence.

## BRITISH COLUMBIAN GOLD FIELDS.

## ROSSLAND AND TRAIL CREEK MINES.

(BY A CORRESPONDENT.)

THIS new gold mining camp has been opened up within the last two years with marked rapidity and immense results.

Roseland is situated in British Columbia—8 miles north of the International boundary line between the United States and Canada. It is reached from Seattle on the Pacific Coast by rail to Southport, Washington Territory; from there by stage-coach a distance of 16 miles. Passengers from the east and north reach Roseland by way of the Canadian and Pacific Railway, and from there by boat to Trail Creek on the Columbia River, 7 miles from Roseland. The altitude of the town is about 3000 feet above sea-level, and is surrounded by the mines which are attracting attention from all parts of the world. At Roseland there is a town population of about 1500 and 2500 in the district. Most of the capital and most of the people come from the United States.

Roseland, Thompson, West Kootenay, Trail Creek, and the Sheep Creek Mines form practically one great mining camp.

The mines in and around Roseland have within the past year or so developed such enormous wealth that they are said to eclipse the best known fields in the world, and are likely to attract the attention of mining men and capitalists from all parts. Indications show that Roseland will become the largest and probably the most prosperous town in the interior of British Columbia. Within two miles of Roseland are mines that should employ 5000 miners within a short time, and that means a population of 20,000 people, and as the district becomes further developed, and more ore smelters and crushers set to work, saw mills, and various kinds of factories to supply the requirements of a rapidly progressing community, Roseland will quickly boom to a great and permanent city. Its situation is all that can be desired for climate, health, scenery, and surroundings to meet the requirements of advanced civilisation. Gold, gold—its rich developments is the secret of the rapid advancement of Roseland into prominent notice as the coming gold field of British Columbia. Silver, lead, copper, and coal were known to exist in abundance, and numerous mines were being opened up with good prospects, but the talismanic sound of gold has had an electrical effect in infusing life and activity into the district as nothing else could have done. Shrewd mining men and capitalists from the United States, Canada, England, Australia, and Africa are turning their attention to the possibilities of British Columbian gold mines, and Roseland is the spot that at once commands the most attention, in consequence of its late rich gold discoveries.

There is a group of mines in this neighbourhood all producing a similar kind of ore out of a similar rock—viz., a hard hornblende diorite. The ore is iron pyrites and copper pyrites containing silver and gold. The veins run in all directions, and the War Eagle and the Josie unite at almost right angles. The whole place is full of veins, and many of them are being worked in force.

The War Eagle Mine has six parallel veins on the surface. It has run two tunnels, 600 and 350 feet respectively, and a third is now being driven to tap the vein 500 feet below, which it is expected to do in 1600 feet. The vein, of almost solid ore, averages about 8 feet. The ore is rich in gold, silver, and copper, and averages throughout about \$50 to the ton; in some places it goes up to \$280.

The Le Roi Mine almost adjoins the War Eagle, and is equally rich. The copper pyrites in this mine average from 1½ to 5 ounces of gold to the ton, and the decomposed vein on the surface goes 3 ounces of gold to the ton. In October last it was estimated there was quite 150,000 tons of ore already in sight in this group of mines, and 3500 tons of ore per month was then shipping. Later dates show that the shaft of the Le Roi Mine is down 430 feet, and the ore taken from the bottom is the highest grade yet taken from the mine. With the exception of the Slocan Star, in Slocan district, the Le Roi is now opened to the greatest depth of any mine in Kootenay. From the bottom of the Le Roi shaft 40 tons of ore was sent to the smelters in the end of January, averaging \$530 to the ton. This breaks all previous records, and stamps the mine as no doubt the richest mine in the country.

It is estimated by well-informed mining men that in the slope between the 350 level and the bottom of the shaft there is 80,000 tons of ore. If this should average \$50 per ton, it would mean \$4,000,000 in sight in this one spot in the mine. The fact that one of this remarkable richness in an orebody of such magnitude as that of the Le Roi, and taken at such depth, is construed by mining men as opening up a field of great expectations for Trail Creek.

The Le Roi is capitalised at \$2,500,000, in 500,000 shares of \$5 each, which are lately quoted at \$7 per share, or a value of \$3,500,000 for the mine. Late reports by letter state the mine has 40 feet of ore, averaging \$90 gold per ton; a dividend, the first of \$25,000, was paid last year, and a second dividend of \$50,000 paid February 1; the third of \$50,000 on March 1, and it is expected that similar amounts will be paid monthly for some time to come.

The War Eagle Mine has a big ore chute, from which 10,000 tons of shipping ore were extracted in the upper levels has been tapped by the No. 2 level after running 700 feet. It is squarely under the works on the higher levels, and will give the company another bonanza from which to pay dividends. The lode is 8 feet wide, averaging \$40 gold per ton.

The other properties allied with the War Eagle continue to look well. The face of the No. 3 tunnel on the Iron Mask is all concentrating ore of high grade, while the tunnel on the Virginia has been in solid ore for some time. The War Eagle group is looked upon as a world beater.

The California Mine, 1500 feet by 1500 (Crown grant), lies due west of the celebrated Le Roi and War Eagle Mines, separated only by a distance of about 1500 feet. The strike of the lodes of these two latter mines being almost due east and west, they pass through the California property from east to west. In addition to the War Eagle and Le Roi lodes there are two other lodes converging in the California property with the Le Roi lode.

The above mines, together with the Josie, the Poorman-Francis, the Iron Mask, Centre Star, Nickel Plate, Golden Chariot, and Great Western are on what is known as Red Mountain.

In 1895 Trail Creek shipped 20,000 tons of ore, but in 1896 there is little doubt but five times this quantity of ore will be produced. This shows wonderful progress in a single year, and justifies the hopes of those who think that British Columbia will have the most prosperous gold mining camps in the world in five years.

## MOUNT ROWE CONSOLIDATED MINING COMPANY.

A circular to the shareholders states:—In a letter received from Mr. Wright by the last mail, dated January 23, speaking of the Regina shaft, he says:—"I am pleased to say that at the bottom of the shaft (160 feet) we have struck another reef, the thickness of which has not yet been ascertained, but from dollying and washing I have got as good prospects as from any stone yet found on the property." In reply to a cablegram sent to Mr. Wright, asking for particulars of this new discovery, he telegraphs as follows:—"The average width of the lode is 5 feet 7 inches, and the average value 2 ounces of gold per ton of 2000 lbs. Have finished erection of hoisting machinery. Extension has been granted on the other leases, in order to concentrate labour on this Regina lode."—Hubert Akers, secretary.

THE Clarkson-Stanfield Ore Reduction Company (Limited) have just shipped a 50 ton plant to Johannesburg, on the order of Messrs. Quinten and Tarbutt, and we understand that it is to be erected on the Village Main Reef Mine. Five tons from the mine is now being treated by the Clarkson-Stanfield process with a recovery of 90.2 per cent. of the gold contents, including the fine dust.

THE OURE PRETO GOLD MINES OF BRAZIL (LIMITED) have sold the January gold for £6072 9s. 11d.



# NOTES ON GOLD MILLING IN CALIFORNIA.

By ED. B. PRESTON, M.E.

Bulletin No. 6, issued by the California State Mining Bureau.  
(Continued from page 336.)

## Power for Mills.

On account of the favourable position of the majority of California mines as regards their proximity to mountain streams and the large ditch systems, the application of water for the motive power of the mills is rendered easy, and where the distance from these sources is remote, electricity generated in such localities and transmitted to the mill is being successfully applied. Where steam power has to be used, the well-timbered western slopes of their Sierra Nevada permit the cost of fuel to be kept at a comparatively low figure. Where both water and timber are hard to obtain, as in the desert regions of the southern part of the State, gas engines have been applied with most satisfactory results.

In applying water power, where the pressure is sufficient, hurdy-gurdy wheels are chiefly used. These are vertical wheels with narrow breasts, having buckets of various patterns radially attached to the outer circumference, the water being projected through one or more nozzles against the buckets at a low point of the wheel, allowing the water to pass from the buckets as soon as the blow has been delivered. The principal patterns in actual use are the Knight, Pelton, and Dodds; the actual effective power developed by the Pelton buckets is given at about 75 to 80 per cent. Where sufficient pressure cannot be obtained, the Laffel turbine and the overshot wheel are in use. As the Pelton wheel seems to find the most frequent application in California, it may be convenient for millmen to have the following rule, applicable to these wheels:—When the head of water is known in feet, multiply it by 0.0024147, and the product is the horse-power obtainable from one miner's inch of water.

The power necessary for different mill parts is:—  
For each 850 lbs. stamp, dropping 6 inches 95 times per minute . . . . . 1.33 H.P.  
For each 750 lbs. stamp, dropping 6 inches 95 times per minute . . . . . 1.18 H.P.  
For each 650 lbs. stamp, dropping 6 inches 95 times per minute . . . . . 1.00 H.P.  
For an 8 inch by 10 inch Blake pattern rock breaker . . . . . 9.00 H.P.  
For a Frue or Triumph vanner, with 220 revolutions per minute . . . . . 0.50 H.P.  
For a 4 feet clean-up pan, making 30 revolutions . . . . . 1.50 H.P.  
For an amalgamating barrel, making 30 revolutions . . . . . 2.50 H.P.  
For a mechanical baten, making 30 revolutions . . . . . 1.00 H.P.

## Mill Practices.

Where the conditions permit, it is becoming the custom to place the grizzly and the rock-breaker in close proximity to the hoist, so that the bucket or car on arriving at the surface is dumped direct on a grizzly, and the crushed ore is then run over the ore-bin in the mill, and emptied therein. Where this is impracticable, the grizzly and rock-breaker are placed over the ore bin in the mill.

The usual practice is to let the coarse ore from the grizzly drop on a platform on a level with the mouth of the rock-crusher, into which it is shovelled by hand. By this method the machine is not brought up to its full capacity. A better plan is to convey the coarse ore from the grizzly into the bin by means of a chute, having a sliding gate immediately above the receiving point of the crusher, and which is set so as to keep the space between the jaws always filled. In this way the work becomes automatic, and the services of the man attending the rock-breakers can be utilised in other parts of the mill during part of the time. Under such an arrangement the crusher will require more power, which should be independent from the other machinery. The rock-breaker is usually run during the daytime only, as it can crash in that time enough ore for the mill for the 24 hours.

The self-feeders, in a similar manner, are kept automatically filled from the main ore bin. The feeding through the tappet striking on the bumper rod of the self-feeder has of late been modified. A collar is fastened below the guides on the feed-stamp stem, taking the place of the tappet, thus avoiding the long bumper rod. The gauging of the feed must be carefully attended to if the stamps are to work up to their full capacity; there should never be more than about 1 inch of rock between the stamp and die when they come together, or the feed should be just sufficient to keep from striking iron. When cleaning up the batteries, the self-feeders are drawn back on a track toward the ore bin, giving access to the back of the mortars.

In preparing the mortar for ore crushing, an inch or two of tailings is spread evenly over the bottom before putting the dies in place, as this saves the wear on the bottom plate. After the dies are placed exactly under each stamp, crushed ore and fine rock are banked around them to retain them in proper place until the sands have settled firmly about them. Care must be observed to keep the tops of all the dies at the same level at all times, as otherwise, when the stamps are dropping, the highest die will strike against iron, while the others are still supplied with sufficient ore; this is known as "pounding."

The stamp head, or boss, is now placed on the die with the small conical opening at the top, and the stem lowered into it, iron against iron if it is a close fit, and driven in solid. In case the connection is not tight, canvas strips about 2 inches wide are laid crosswise over the opening before the stem is lowered. The stem, with the stamp head, is now raised until the latch finger catches under the lower face of the tappet and holds them suspended, and the shoe placed on the die. If the stamp head hangs too low to permit of this, the stem is raised, and a block placed on top of the finger for the tappet to rest on. Narrow wooden wedges, about 1 inch wide, the length of the neck of the shoe, and of the requisite thickness to fit tightly into the conical opening at the bottom of the stamp head, are arranged in place and tied with a string. The block and finger are then removed, the stamp head dropped over the shank, and wedges driven down firmly. This is done best by revolving the cam shaft slowly, and, while placing the cam stick between, permitting the cam to act on the tappet, raising and dropping the stamp until the lower edge of the stamp head is nearly in contact with the shoulder of the stamp. It is not advisable to permit them to come solidly together, as it tends to loosen the iron ring that reinforces the stamp head. A quick and convenient method of placing the wooden wedges on the shoe is to cut a piece of canvas to fit exactly around the neck, and attach the wedges to the canvas by driving a tack through each one into the cloth. By keeping a supply of these on hand, it becomes an easy matter to encircle the shank on the shoe and tie them fast, should the shoe become loose and drop off while the mill is running.

The Drop.—The next operation is fixing the distance through which the stamp is to drop before striking the die. In most mills this distance is uniform for all the stamps; but, as previously stated, occasionally the stamp operating the feed, as also the two outside stamps, receive a greater drop.

The right height to give depends on the nature of the ore, as also on the speed to be given to the stamps; that is, the number of drops per minute. The tendency in most California mills is

to run at a high rate of speed, usually in the neighbourhood of 100 drops per minute. The height varies from 4 inches to about 10 inches, generally but little, if any, above the water-level in the mortar.

In arranging the stamps for an equal drop, wooden blocks, cut about 1/4 inch longer than the drop the stamps are to receive to permit the cams to clear the tappets, are placed on the die, between it and the shoe. Pieces of 2 by 4 scantling, cut to the desired length, answer well for the purpose. The keys in the tappet are loosened with a drift made of steel, the size of the keyholes, and used only for that purpose, and the stem is allowed to slip through the tappet until the shoe rests on the top of the wooden block beneath; or, if the shoe was resting on the block previously, the tappet is slipped up till resting on the latch-finger, when the keys are driven home solid. Care must be exercised not to drive the keys too solid, else there is danger of splitting the tappet. For the convenience of the millman, a chalk mark is made around the stem just above the tappet, which enables him, while running, to at once detect if any of the tappets have slipped. Should this occur it must be immediately re-set, or the battery work will be irregular. The battery plates and chock blocks are next put in place and keyed.

The Discharge is next arranged. This is the distance between the top of the new dies and the lower edge of the screen, and to fix the right distance is of importance. The greater the height of the discharge, the greater will be the proportionate amount of pulp and slime, and they also will be retained longer in the mortar. The quantity of amalgam retained in the mortar is also proportionately greater. A low discharge calls for a coarser screen, and naturally results in a larger output of the battery, and with a larger proportion of outside plate amalgam. With a constant height of the screen, the natural wear of the die increases the height of the discharge. For ordinary iron shoes and dies, and average rock, the wear of the die is roughly estimated from 1/4 to 1 lb. of iron per ton of ore crushed. To counteract the effect of this wear on the discharge height, different sized chock blocks or screen frames are supplied; the highest being used with new dies, and later replaced by lower ones, thus holding the distance more even than the use of a single size would permit. In some mills, when the dies are worn down, an iron plate, made for the purpose, is laid beneath them to raise them up.

As a very high discharge, besides creating much slime, beats up a larger portion of the gold into float gold than would be the case with low discharge, the choice necessarily influences the gold recovery; this is more particularly the case, if the ore carries any appreciable amount of valuable sulphurets. The discharge varies in the different mills from 4 inches to 10 inches, the average being from 6 inches to 7 inches.

Screens.—In fastening the screen to the screen frame, care must be observed to get it on smooth, without any wrinkling or buckling. Tin screens must have the tin burned off before fastening to the frame; it is also well to expose the Russian iron screens to a quick fire of shavings, to burn off the oil with which they are more or less faced. The edges of the screens are tacked to the frames, and are faced with strips of blanket to make a close connection with the mortar. In fastening a wire cloth screen, to get it on smooth, a good method is to tack it first along the lower edge, then draw it up tight, and even over the upper edge, and nail it before cutting it off the roll. As previously stated, brass wire screens should not be used in conjunction with cyanide of potassium, as the brass becomes coated and clogged with amalgam. The screen frame with screen is dropped into the grooves cast on the outside of the mortar discharge, and fastened solid with iron wedges—two vertical (one for each groove) and a horizontal one in the centre of the lower lip. The wedges should have a broad head, to facilitate knocking them out. After the screen has been fastened in place, a piece of canvas, or a board, should be hung in front to arrest the outward throw of the pulp from the drop of the stamp, and direct it in an even flow on to the plates beneath. In some mills this board is given a slope towards the screen, and has an amalgamated plate screwed on, which receives the splash. Bolted to the front of the modern mortars is a frame to carry the outside battery plate and a distributing box, a few inches above the apron table on which it discharges.

When everything is ready to drop the stamps, the self-feeder is rolled to its place, the cam shaft is set to revolve slowly, the water is turned into the battery, and the millman, standing on the platform above, grasps the hand-hold of the first finger or prop, and introduces, with the other hand, the cam-stick between the tappet and the revolving cam; by this means the weight of the stamp is taken off the prop, which is pulled back and rested against the edge of the platform. This operation is repeated with each stamp until all are working. To carry out this operation when the shaft is revolving rapidly, without injuring the operator's hands, requires practice. The cam-stick mentioned above consists of a piece of wood of about 2 1/2 feet long, 1 inch thick at the point, running up to 2 1/2 inches near the handle, and faced with strap iron or a strip of belting. It may also be made entirely of strips of belting, 2 inches or 3 inches wide, nailed over each other and attached to a wooden handle. To hang up the stamps the hand-hold is grasped, the knee pressed to the latch-finger, and the cam stick introduced between cam and tappet as before, and the latch-finger pushed under the tappet.

Before dropping the stems the face of the cams should be lightly lubricated, for which purpose axle grease or specially prepared compounds are used; a very useful one is a mixture of graphite and molasses; in some mills, to avoid the use of grease, the face of the cam is rubbed with a bar of common soap.

Grease.—It being essential, for good amalgamation, that the presence of grease be avoided in the battery, care must be observed in lubricating the cams, the stems where passing through the guides, and the shaft bearings. In many mills, trays made from old oil cans are fastened beneath the bearings, cloth aprons are tacked from the underside of the guides to the floor above; rings of rubber packing or old belting also encircle the stems at the lower edges of the guides. The millman should diligently wipe off the stems and any part of the battery frame, where the presence of grease is indicated, at least once during a shift. Grease in the mortar is indicated by a black, dirty appearance of the surface of the plates, as also by the adhesion of more than the usual proportion of the amalgam to the iron casting inside the mortar. The usual remedy is to shut off a part of the battery water, for a short time, while adding a lye solution, or to add fine wood ashes to the ore.

The amount of water required for the proper working of the battery depends on the nature of the ore; clayey ores, or such as have a high percentage of sulphurets, requiring the most; but while in the former case a greater amount is needed inside the mortar, the latter condition permits a part being added outside the screen, on the lip of the mortar. A small sluice box, with plug holes, is placed across the front in this case, or the water is conveyed by means of a 1/4 inch perforated iron pipe, attached to the vertical supply pipe by an elbow joint, permitting it to be turned either way as required. "The amount of water used per ton of ore stamped varies from 1000 to 2400 gallons, with a mean amount of about 1800 gallons per ton of rock crushed." Most of the mills in actual practice figure roughly

\* See Eight's Report of State Mineralogist, p 710

on one miner's inch of water, more or less, per 24 hours for each battery of five stamps. To obtain the largest amount of crushing of clean quartz from a battery, only sufficient water should be used inside to keep up the regular even wash of the pulp, and if that be not sufficient to keep the plates on the outside clear from accumulating pulp, more may be added outside the screen. The pulp, in passing down over the apron plate, should roll in successive waves, corresponding to the back and forth wave-motion inside the battery, rather than flow in an even sheet, as affording a better opportunity of contact for the particles of amalgam.

Where the temperature falls low in winter, arrangements should be made to deliver the water in a tepid condition, as better amalgamating results will be obtained, through keeping the quicksilver in a lively condition. Where steam power is used, this can be easily arranged; but when using water power, a separate heater is required.

Feeding.—Hand-feeding has become nearly obsolete in California. It is only practised in small concerns, or where a temporary mill has been put up for prospecting purposes. The advantages of a machine-fed mill are numerous; the chief of these are—(1) that the wear of the iron of the shoes and dies is less and more even faced; (2) that from 15 per cent. to 20 per cent. more ore can be crushed in a given time; and (3) that the labour expenses are reduced. The machines should be carefully gauged and watched to insure a steady, low feeding of the stamps. In order to insure a good splash in the mortar attention must be given to the succession in which the stamps are made to drop. A good splash is one that shows a wave passing along the lower edge of the screen, moving backward and forward from end to end, or a similar wave-motion that has its initial point from the centre stamp. The succession most frequently adopted in California is 3, 5, 1, 4, 2; 1, 5, 2, 4, 3; 1, 3, 5, 2, 4; and 1, 4, 2, 5, 3; the last spreads the pulp very evenly from end to end. The greatest amount of discharge is obtained apparently by dropping the centre stamp first; while the most crushing is done, other conditions being equal, by dropping the end ones first. Any arrangement of the stamps will answer, however, that distributes the pulp evenly and discharges it well.

The Apron should be set immediately in front of the mortar, but independent of the battery frame, to exempt it from the jar of the stamps; it should be arranged to permit of the grade being easily altered if necessary. The size, shape, and grade of the apron plates differ widely, depending largely on the millman's preference and experience. The usual form of the apron is rectangular, of the width of the discharge, and any length desired, but usually from 4 feet to 12 feet, forming a level (transversely), smooth surface, set on a grade varying from 1/4 inch to 2 1/2 inches to the foot. Sometimes the surface is divided by steps, with or without distributing boxes. These are usually from 1 inch to 2 inches. The apron should never be drawn in at the lower end, for reasons given further on; and the steps should not be too deep, as otherwise the plate next to the drop will show mostly bare copper through scouring.

(To be continued.)

## BRITISH GUIANA'S GOLD INDUSTRY.

The following is the amount of gold entered at the Custom House for shipment by the R.M.S. *Esik*, and the names of the shippers:—

	Ozs.	dwt.	grs.	Total Value
Colonial Bank	938	0	20	
British Guiana Bank	2598	18	11	
Total	3,537	5	7	\$63,203.00

The following are the returns of gold entered at the office of the Department of Mines for the weeks ending:—

	February 15.	February 22.
	Ozs. dwt. grs.	Ozs. dwt. grs.
Barama	39 19 22	78 4 22
Bariraa	442 12 9	229 6 3
Cuyuni	331 4 15	272 17 17
Essequibo	46 3 23	557 8 5
Groete Creek	1 17 13	27 1 15
Potaro	108 10 12	196 16 19
Pardai	233 7 9	195 0 16
Total	1203 16 7	1556 16 1

Export of gold, January 1 to March 2:—

	Ozs.	dwt.	grs.	Total Value
1896	10,826	1	21	\$192,678 97
1895	11,358	14	14	\$202,455 13

PRODUCTION OF BESSEMER STEEL INGOTS AND RAILS IN THE UNITED STATES IN 1895.—Mr. James M. Swank has just published, in the *Bulletin of the American Iron and Steel Association*, the complete statistics for the year 1895, of the production of Bessemer steel ingots and Bessemer steel rails of all weights and sections, in the United States, except the comparatively small quantity of standard rails, and a larger quantity of street rails which were made by manufacturers from purchased blooms. In the statistics of ingots produced are included the production of the few Clapp-Griffiths and Robert-Bessemer plants, and also the production of steel castings by all Bessemer works.—Ingots: The total production of Bessemer steel ingots in 1895 was 5,909,128 gross tons, against 3,571,313 gross tons in 1894, showing an increase in 1895 of 1,337,815 tons, or over 37 per cent. The production in 1895 was much the largest in our Bessemer steel history. The following table gives our production of Bessemer steel ingots in the last 10 years:—

Years.	Bessemer.	Years.	Bessemer.
Gross Tons.	Ingots.	Gross Tons.	Ingots.
1886	1,269,190	1891	3,247,417
1887	2,936,033	1892	4,168,435
1888	2,511,161	1893	3,215,686
1889	2,950,204	1894	3,571,313
1890	3,688,871	1895	5,909,128

With an estimated production in 1895 of over 1,000,000 tons of open-hearth steel, soon to be accurately ascertained, it is probable that our total production of steel in that year exceeded 6,000,000 tons. Great Britain's total steel production has never amounted to 4,000,000 tons in any year.—*Journal of the Franklin Institute.*

PROSPECTING IN INDIA.—Mr. Charles E. Simmons, discussing what he calls the "rules for the discouragement of mining in India," says that one of the most absurd features of the new rules for prospecting in India is that the owner of an exploring licence is not allowed to turn up the ground beyond the depth of 2 feet. This is what is called "hen scratching" in Australia, and will, he expects, be more honoured in the breach than in the observance.—*Indian Engineer.*

Fossils at Bloomsbury.—The Geological Department of the British Museum has just purchased the remarkable collection of fossil bird remains made by Dr. Florentino Ameghino during his expedition in Patagonia in 1887, when his discoveries of fossil remains of large flightless birds aroused the greatest interest among geologists and zoologists. The characters of the forms are those of gigantic birds which must have gradually lost the power of flight.

COAL MINES IN INDIA.—The losses on coal working at home contrast sharply with the profits on that industry in India. A list of 13 coal companies is given in a Calcutta newspaper. The dividends declared for the past year are, so far, 10. The lowest is 6 per cent, per annum, and the highest 17 per cent. Probably cheap labour and a demand above the local supply are the explanations.



## THE EASTERN LIMITS OF THE MIDLAND COAL FIELD.\*

By Prof. EDWARD HULL, LL.D., F.R.S., F.G.S.

THE writer has been invited by the Council to read a paper at this meeting on the subject of "The Eastern Limits of the Midland Coal Field." In order to approach the subject, it is necessary first to determine what is the meaning and extent of the term "Midland Coal Field." It seems to be a collective term; not intended to designate a single coal field, but a group, in which may be included those of North and South Staffordshire, Leicestershire, and Warwickshire. These four visible coal fields lie in the centre of England, and for the most part south of the River Trent, and are isolated from the great coal-bearing tracts of the North of England, either by considerable areas of Triassic strata, or (as in the case of the North Staffordshire coal field) by the uprising of the Lower Carboniferous rocks. For the purpose of this enquiry, however, it is only necessary to deal with the Leicestershire and Warwickshire coal tracts, which may be regarded as the outward and visible signs of extensive sheets of concealed coal measures connecting them, to a greater or less extent, with the more westerly coal fields of North and South Staffordshire.

The subject is one of very great importance, though not as regards the immediate future, since we have really more available coal than we can well dispose of at the present time. But it is not the less incumbent upon us to look ahead in order to get a fair idea of our possible coal resources, for it is absolutely certain that we are using up those resources very rapidly: that is to say, we are drawing upon our capital of mineral fuel.

After giving an historical review, the writer went on to give some details regarding actual investigations by boring, and began with Leicestershire.

Leicestershire.—It had always been hoped—the writer might say expected—that a considerable reserve of coal would be found under the Triassic strata lying to the south and west of the Leicestershire coal fields. Collieries have been opened to work the main seam under the New Red Sandstone at Overseal and Netherseal in this direction. But the condition of this important seam, interrupted and much spoiled as it is by bands of sandstone, appears to indicate an approach to the original margin of the Carboniferous basin. The proximity of this marginal land, formed of much older rocks, has, the writer regrets to say, been recently determined by direct borings undertaken by the Netherseal Colliery Company at a distance of about 1 mile south of the existing colliery, and gave the following generalised results:—

1. New Red Sandstone, with pebbles of quartz..	Feet. 262
2. Coal measures above the main seam ..	514
3. Older Palæozoic rocks ..	19

Total .. 795

The older Palæozoic rocks (No. 3) consist of reddish, purple, and grey grit, sandstone, and micaceous quartzite, destitute of fossils, and thus contrast with the coal measures above (No. 2), which are full of plant remains. A second boring, put down about one mile further to the south-east, gave similar results, when reddish vitreous quartzite, slightly micaceous, was penetrated at a depth of 760 feet. This rock bore a strong resemblance to the Hartshill stone of Warwickshire. On examining these cores the writer came to the conclusion that they belong to the Cambrian system; a conclusion in which Professor Lapworth concurs.† It is clear, therefore, that a ridge of these very old rocks here replaces the middle and lower coal measures, together with all the Lower Carboniferous strata, and cause the productive coal measures of the Leicestershire coal field to terminate towards the south-west, just as the old rocks of Charnwood Forest form their limit in the opposite direction.

Between this concealed ridge and the visible Charnwood Forest rocks there lies a deep bay of coal measures concealed by Triassic strata, in which the Ibstock and Bagworth collieries are located; and the boring through the red marl near Desford, about 6 miles west of Leicester, which is said to have reached coal measures, shows that this bay stretches far towards the south. Further east, however, the bosses of syenite of Mount Sorrel, Barrow Hill, Stony Stanton, and Sapcote, rising above the plain of the New Red marl, appear to be clear indications that the centre and east Leicestershire are underlain by rocks much older than the Carboniferous.

Warwickshire.—The eastern margin of the Warwickshire coal field is clearly indicated by the Lower Silurian (or Upper Cambrian) beds, consisting of the Hartshill quartzite and Stockingford shales which rise from below the coal measures, from Atherstone on the north to the neighbourhood of Bedworth on the south, where the coal measures pass below the New Red marl. Coal is now worked below this formation as far as Wyken, and may extend some distance yet further south. Some years ago the writer was under the impression that coal measures might set in to the east of the ridge of Hartshill; but further consideration, fortified by further researches, now leads him to abandon this view, and to consider it as improbable that coal will be found under the tract around Hinckley, under the Triassic strata. Further borings are desirable in order to determine this point with certainty.

Northamptonshire.—The borings which have been put down in this county have been undertaken chiefly in search of water. But in at least two cases the Palæozoic rocks have been proved beneath those of Mesozoic age, and, therefore, throw light on the structure of the county at considerable depths. These the writer will further describe:—

1. At Orton, a village about 10 miles north of Northampton, a boring has been put down commencing in the Lias, and after passing through the New Red marl, entered rocks consisting of hard grits and slates. On examining specimens sent to the writer by the late Mr. Samuel Sharp, of Great Harrowden Hall, at the time (1881), he came to the conclusion that they were of Lower Silurian or Cambrian age.

2. Near the town of Northampton there have been several borings in which the rocks reached are, according to Mr. Whitaker, older than the Carboniferous, and the Trias (red marl) is thin, and in one place absent. In one of the borings, however, Carboniferous limestone with characteristic fossils, determined by Mr. Etheridge, was passed through at a depth of 800 feet. Mr. Etheridge suggests that here is an indication that in the tract between Northampton and the exposed coal field of Warwickshire, there may be "an extended coal field." This the writer much doubts, for although the presence of Carboniferous limestone at Northampton presupposes the former existence of coal measures, he fears that, owing to an extended period of denudation previous to Triassic times, the upper Carboniferous beds have been swept away in the tract referred to. This, however, is a point that can only be absolutely settled by direct boring experiments, which are much to be desired.

\* From a paper read before a recent meeting of the Federated Institution of Mining Engineers.

† Report of the British Association, 1893, pages 745-8.

Buckinghamshire, &c.—Somewhat further south, at Bletchley, a boring was made a few years since in search of water by the London and North-Western Railway Company, and a rock was reached beneath the Lias, a specimen of which the writer had an opportunity of examining. It proved to be a felsite, and seems to indicate the presence of old rocks invaded by trap. Other borings at Ware, Cheshunt, and Culford have proved that Upper Silurian beds lie beneath the Mesozoic strata. These localities are, however, too far removed from the district of the Midland coal fields to be further noticed here. They are rather connected with the structure of the region of the London Basin, and are only interesting to us as confirming the absence of coal under this part of England.

Suffolk.—A most important boring has recently been carried out under the East of England by the Eastern Counties' Coal-Boring Association. To the subscribers to this association it must needs be disappointing; but it is of great interest to geologists as going very far towards settling the question regarding the presence or absence of coal under East Anglia. The position of the experiment is the valley below Cropping Hall, near Stutton, close to the borders of Norfolk and Suffolk, and the following is a generalised section of the boring:—

	Feet.
1. Gravel, &c. ..	16
2. Tertiary strata ..	54
3. Upper, middle, and lower chalk ..	874
4. Gault clay ..	50
5. Palæozoic grits and slates ..	534

Total .. 1528

Further boring experiments in well-selected spots are certainly desirable, and may result in agreeable surprises; but as regards this point the writer does not profess to be sanguine.

South Staffordshire and Worcestershire.—It now only remains to deal with the question of the limits of the South Staffordshire coal field towards the east and south. As Professor Jukes has shown, a Silurian land surface, formed of strata slightly rising towards the east, occupied originally what is now the southern portion of this area. The uprise of the Silurian quartzite of the Lickley Hills through the Permian beds proclaims the limit of the Carboniferous strata in a southerly direction. But, considerably to the north of this, the southern limits of the productive coal measures have been proved by the shafts which, some years since, were put down by Messrs. Dawes at Wassel Grove and Manor Farm, about 2 miles south of Halesowen. Here the thick coal seam was only represented by "fragments of carbonised plants mixed with sandstone and fragments of Silurian rock; while, a little lower, the shales of the Upper Silurian formation with *Pterygotus* were passed through for some considerable depth." This experiment, so costly and disappointing to the enterprising owners of the shafts, settles the question of the southern limit of the thick coal, and proves that it does not extend much (if at all) beyond the margin of the Permian beds, where they sweep from west to east across the coal measures a little north of the Clent Hills.

On the other hand, the successful experiment to prove the thick coal seam at Sandwell Park, near Birmingham, under the Permian beds may be regarded as a set-off to the failure at Wassel Grove, and shows that the Silurian ridge keeps well to the east of this spot. In fact, it seems probable that the limit of the productive coal measures with the thick coal seam passes in a north and south direction under the new red sandstone of Birmingham. This ridge curving round from east to north probably divides to some extent the productive coal measures of Warwickshire from those of South Staffordshire, and ranges northwards in the direction of Barr Beacon; but new experiments, by boring or otherwise, are much to be desired, in order to define more accurately the extent of this concealed barrier of Silurian rocks.

In conclusion, it will be inferred from the evidence before us that the old Cambro-Silurian rocks formed a ridge trending from Salop and Worcestershire, eastwards into the eastern parts of the counties of Warwick and Leicester, which was very irregular in its outline, and sent out ridges in a northerly direction, separated by intervening bays. Against the shelving sides of these ridges the coal measures were deposited, filling up the bays as the region gradually subsided under the Carboniferous waters, and in consequence the upper coal measures cover a more extended area than the productive middle beds, and these than the Lower Carboniferous, which are altogether absent in South Staffordshire and Warwickshire.

The writer has been encouraged by a well-known geologist and former colleague to hammer away at the process of extending the coal areas eastward. He fears the result of his hammering has not been, as in the case of a piece of beaten gold, to extend its surface, but rather to cause it to assume smaller dimensions.

\* For which the writer is indebted to Mr. Whitaker, who informs him that the direction of the dip is generally southward, not strictly south.

### JULIA-TALTAL NITRATE COMPANY (LIMITED).

The annual general meeting of the shareholders in the Julia-Taltal Nitrate Company (Limited) was held on Tuesday, at the Cannon-street Hotel, Mr. H. W. Carter presiding.—The Chairman, in moving the adoption of the report, said in regard to the stock of nitrate and caliche in the balance-sheet, this would taken at \$2 per quintal, and they had had it shipped this month to Liverpool, where they hoped to realise at least the amount taken credit for. In July the work of manufacturing was stopped, owing to the low price of nitrate. When this company came into existence in June, 1894, the price of nitrate was about \$6-37, equal at the exchange of 11½d. to 6s. 1½d. per quintal, while at the time work ceased it was only 5s. 3d. The board had purchased and despatched the whole of the plant for the extension of the factory, and the company had no debts except debentures, but it would be necessary to provide more funds for erecting the plant and for working capital. When the office was completed there would be a fair profit on manufacturing. The combination in fact made this a certainty.—In the course of a discussion great dissatisfaction was expressed at the condition of the company's affairs.—Mr. George Hume moved, as an amendment, that the report and accounts be referred back, and that the meeting be adjourned until April 14, for the purpose of enabling the board to revise and complete the accounts by presenting a revenue account.—The amendment was seconded and carried by 22 votes to seven.—The meeting then terminated.

MINING IN NOVA SCOTIA.—The official report of the Department of Mines has reached England from Nova Scotia. It shows that there was a slight decrease in the coal raised—the year's output falling from 2,200,235 tons to 2,089,245 tons. A tenth part roughly represents the colliery consumption. Of the remainder, nearly one-third is used in Nova Scotia; fully a third is for Quebec; and the rest is divided, the United States taking some 73,000 tons—an increase on the previous year.

COAL FOR STEAMERS.—During the month of February the quantity of coal shipped at the ports of the United Kingdom for the use of steamers engaged in the foreign trade reached a total of 659,718 tons, as compared with 653,285 tons in the corresponding month of 1895, and 656,123 tons in February, 1894. The quantity shipped for the same purpose during the first two months of the present year was 1,510,785 tons, as compared with 1,384,834 tons in the corresponding period of 1895, and 1,396,593 tons in the first two months of 1894.

## GOLDEN WESTERN AUSTRALIA.

At a meeting of the Royal Colonial Institute on Tuesday last, Sir FREDERICK YOUNG, K.C.M.G., in the chair, a lecture on Western Australia was delivered by Dr. C. CHEWINGS, Ph.D., F.G.S.

Having spoken of the object of his visit to Coolgardie, the topographical features of the field, and the rainfall and climate, he described the forests and vegetation, and related what great difficulties the pioneers had overcome. He then spoke of the rock formations as follows:—

### Geological Structure.

The Foundation Rocks over the area under notice are schist and slate. Chemically these range from the most acid to the most basic; petrologically from amphibole to quartz schist. The geological age of these "oldest" series of rocks is still undetermined, for no fossils have yet been found in them. They are probably not younger than Cambrian. Their strike is, in general, north-north-west and south-south-east, and they dip either to the east or west, usually at very steep angles, or perpendicular. Interbedded with these, but of somewhat rare occurrence, are limestones. I have not seen good examples myself, but I have reason to suppose this is the case. Then there are vast beds of conglomerates interbedded with the schists and slates. One bed may be seen 8 miles west of Hannans, and another at the White Feather. At the latter place gold-bearing quartz reefs occur in the conglomerate. The composing pebbles, which are well rounded at both places, are cemented together by siliceous matter, and have undergone great compression. They are composed of limestone, of porphyry, of quartzite, of granite, and even of almost pure magnetite. By compression the limestone pebbles are seen to have been drawn out into lenticular-shaped bodies. As I shall again refer to these foundation rocks when particularising the different areas, I will merely add that they, together with the other rocks I am about to refer to, deserve far more time and closer study than I have been enabled to devote to them. They should be mapped by competent geological surveyors, and be accurately determined both for scientific and commercial reasons. It is in this series, more often than not, where the gold-bearing lodes and reefs are seen to lie. We will now pass on to note another very important series.

The Eruptive Rocks on the Coolgardie gold field are full of interest, both scientifically and commercially, not only on account of the gold-bearing reefs that occur in them and also in their near proximity, but because it is they, so far as I am able to judge, that were the gold bringers. In my opinion the Coolgardie gold field is the site of a mountain chain or chains, that for long, long ages have been worn down, and planed off, so to say, to its very roots. What we see now are but the upturned edges of rocks that during the crumpling of the earth's crust, and process of mountain building there, formed quite elevated tracts of land. I will ask you to imagine a large mountain chain, say like the Andes, stretching from Esperance Bay, and possibly far south of it, northward to beyond the Ashburton River. I will ask you to admit that this range was a line of weakness in the earth's crust, up through which vast masses of highly heated rock found their way. Large quantities of molten rock may have been poured out on the surface, but this would be as nothing in comparison with what remained deeply buried in the heart of the mountain chain, and cooled and crystallised there, in cracks and immense fissures, under the enormous pressure of overlying rock. In fact, it appears to me probable that vast areas of land were pushed upwards to make room for the molten masses. They are of Palæozoic or Azoic age.

### The Origin of the Gold.

Now, during the cooling of such enormous and highly-heated masses in the heart of that mountain chain, you can well imagine how greatly the rocks in contact with and adjoining them would be affected. Those of you who have studied these contact effects will know that the character of rocks can be entirely altered in this way, and certain minerals be changed to others. Not only is this the case, but it is also highly probable that during this "cooling time" a process of extraction from the surrounding rocks goes on. Silica (quartz) may be extracted from those minerals called "silicates," and the same be deposited within the cracks and fissures that are formed either by contraction or earth movements. We usually speak of this as the famous or hydrothermal period. Whether the gaseous exhalations from the "hotpot" below brings the gold, or whether the enormously highly-heated waters and steam that have access to the surrounding rocks dissolve the gold, and also other elements out of rocks that already contain it, is not, to my satisfaction, determined yet. It is possible that a comingling of the two may be correct. I refer to the real origin of the gold. While gold-bearing veins at Coolgardie occur in such sour rocks as granite and porphyry, it may be possible that the same was dissolved out of basic rocks. On this point I will not commit myself. Now that those large masses of rock that were once deeply buried in that mountain chain have by erosion become exposed, we can study them; they are called "Abyssal rocks." The point I wish here to emphasise is this—viz., the gold-bearing veins and lodes at Coolgardie are never far from those abyssal rocks. It matters not to which part of the field you go, you are sure to find them. I cannot point to any one kind of rock that may be said to be the gold bringer, for gold-bearing reefs and lodes occur near, and in granite, diorite, and porphyry alike. I may tell you that these varieties occur in the greatest profusion all over the gold field. Some are seen to have been crushed; and it is evident that times of eruption and cooling were followed by times of compression and considerable earth movements. During contractions the most solid rock was squeezed into lenticular-shaped masses, or compressed and made fissile like the leaves of a book. All of these phenomena appear to have been repeated, perhaps many times over, for vast areas of the first-named foundation rocks are crushed abyssal rocks. It is also evident that erosion was going on at that time, because those conglomerate beds I have referred to were in existence. Of crushed eruptive rocks that have come under my notice, diorite and porphyry (? porphyritic granite) are the more common; but of both there are numerous examples where they appear to have suffered little or no compression, but the diorites have in most cases undergone some dislocation.

These troubled times, so far as I am at present able to judge, ended with those enormous eruptions of granite, which said rock forms so much of Western Australia. It has been thought by some that granite forms the foundation of that part of the Australian Continent, but I hold a different opinion, and consider the schists of far greater age, and the granite as intrusive.

He then spoke of the permanence of the reefs, of the water supply, of the alluvial gold and the auriferous cement deposits, after which the principal gold-reefing districts were briefly described, and opinions expressed on them. The routes railways would probably take were then stated, and the necessity for their early erection as well as a vigorous water conservation policy. The future prospects of the field were discussed, and the paper concluded thus:—

The area we have had under review measures about 200 miles wide by 300 long. What number of mines will eventually be worked in this alone, I am afraid to say. The yield of gold per ton of ore, so far as one can judge, will exceed that of most gold fields. The numbers of reefs that are known to be auriferous have probably never had an equal on any gold field. New discoveries are being made all over the field almost daily. The developments so far, I consider, taking them as a whole, are encouraging and satisfactory.

The subject of my paper is the Coolgardie Gold Field. I may tell you, is a comparatively small part of the gold-bearing country in Western Australia. At intervals gold-bearing areas extend far away to the north to near Cambridge Gulf. With such an extent of auriferous country no surprise need be felt at a constant supply of mines being brought to London. The colonists have not the capital to develop so many, leave alone to put machinery on and work them.

It now only remains for me to say that when the gold mines in Western Australia are fully developed and vigorously worked, the yield of gold will, in my opinion, be very great. There is no speculation, to my way of thinking, about the future of what I have seen. Gold mining will be an industry there; it has come to stay, and the field is a large, rich, and permanent one.



# THE INSTITUTION OF MINING AND METALLURGY.

THE annual general meeting of the Institution of Mining and Metallurgy was held on Wednesday evening last, at the Geological Museum, Jermyn-street, Mr. J. H. COLLINS (the retiring President) being in the chair.

The SECRETARY (Mr. E. H. Peers) read the minutes of the last annual general meeting, which were confirmed.

The SECRETARY next read the report of the Council, in which a continued increase in membership during the past year was recorded—an increase of 77, as compared with 49 during the preceding year. The Institution now comprised four hon. members, 187 members, 101 associates, and 80 students. Fourteen papers had been read at the ordinary meetings held in 1895, but the Council called attention to the desirability of sending in for publication short articles or notes on any matters of interest to the profession, since there must always be a large number of members unable to devote the time to longer papers. The statement of accounts submitted showed the Institution to be in a good financial position, and its standing, as a professional society, has clearly become recognised at home and abroad.

Mr. A. C. CAUDET (hon. treasurer) made a brief allusion to the accounts, and estimated that in the coming year the expenses would not be nearly so heavy as in the past year.

The report and statement of accounts were then received and adopted.

The retiring President then vacated the chair in favour of Mr. Joseph Garland, who, he said, had been unanimously elected President for the ensuing year.

The newly-elected PRESIDENT, who was warmly received, said, not having been very well during the last few days, he did not feel equal to the task of reading his address. Therefore, he had asked his friend, Mr. S. H. Cox, to be good enough to read it for him, and he had most readily consented to do so.

Before proceeding with the address, however, a few words respecting Mr. Garland's extensive and varied mining career may prove interesting. In the first place, we might say that it has been an eminently practical one, seeing that he has had experience not only in all quarters of the globe, but of all classes of mines and minerals as well, so that the knowledge he possesses of all phases of mining may truthfully be described as most comprehensive. Indeed, Mr. Garland, during his long career, has visited, inspected, and made the acquaintance of more mines than generally falls to the lot of most mining men, and it may safely be said that very few have a more extended knowledge in this respect than himself. The mines with which he has been connected, and which he has visited or reported upon, number considerably over 100. Mr. Garland, like the majority of mining engineers, is a native of Cornwall, and one of his earliest recollections of mining was his watching the reciprocating motion of the beam of a Cornish pumping engine

experience, with observations upon mining as a profession, a reference to typical mines in various parts of the world, in so far as they serve as illustrations of my remarks, and a brief account of the Colar gold field in India, which I trust will be of interest to you.

In drawing your attention to the conditions of home mining, past and present, I am aware that I am dealing with a waning industry in this country; that the glory of Cornwall as a metal producer has greatly declined, and that the preponderating interest in the art and practice of mining is now centred in the great and ever extending mineral areas in Africa, Australia, and India, but I venture to hope that a brief consideration of the position of the mining industry at home, with a reference to the methods formerly in use, the improvements that have been effected, and the system in operation at the present time, will find a fitting place in the Transactions of this Institution, and be interesting and perhaps instructive to the mining student of the present day.

## Cornish Mining.

In taking a retrospective glance at home mining for the past year, our minds naturally revert to Cornwall, where metal mining has, for many decades, been prosecuted on a more extensive scale than in any other English county, and there we find a state of things which must awaken the interest and excite the sympathy of all English mining men. The past year has been for Cornish mining a disastrous one, and the outlook is still depressing. Nearly all the mines are making calls, and only one or two have paid dividends during the year; even Dolcoath itself has ceased to pay dividends for the time—probably, however, for a very short period only—after an almost unbroken distribution of profits for a long series of years. The chief cause of the general depression and the enormous decline in the market value of the mines is, of course, the continued fall in the price of tin, which in the last five years has dropped no less than £20 per ton, black tin now realising only about £34 per ton, a price at which the majority of the mines, so far from making profits, cannot even meet the working expenses; hence follow the inevitable calls, relinquishment of shares, loss of heart and hope, and suspension of operations.

One of the evils which result from the shutting down of one of a group of mines, so closely connected as many of the Cornish mines are, or which the cessation of pumping for a time entails, is that the water rises and finds its way into the adjacent mines, as is now being experienced, and thus troubles are multiplied, and the burdens on the unfortunate adventurer increased. For months past the Cornish newspapers have been teeming with recitals of the flooding of deep workings, of increasing working costs, of oppressive calls, of relinquishment of shares, of amalgamation schemes, and of proposals for the conversion of the Cost-book mines into Limited Liability companies. There is, however, one burden the Cornish adventurer has to bear, which he naturally feels to be a greater grievance than any other; that is, the hardship of having to pay heavy royalties and rents while he is being called upon to provide the means for developing the mines. It certainly does seem to be an unjustifiable act of oppression to exact dues to the last penny when the long-suffering adventurer is manfully struggling, quarter after quarter, with no dividend in sight, to keep the mines going till better times; and this in face of the fact that the landowner has been receiving regularly large sums in royalty for a long period, and that he will become a considerable participant in any good find or good fortune which may result from the adventurer's plucky confidence and persistent outlay.

It will be a happy day for the county when the era of dues only on profits shall have dawned. I am sure every member of this Institution will heartily join in the cordial wish of "Success to Cornish Mining, and a Better Price for Tin." Naturally, these adverse circumstances have had the effect of turning the attention of Cornish managers to the defects of the Cost-book system, under which no provision is made for working capital. Profits, if any, are divided amongst the adventurers, or, if the operations result in a loss, a call is made to meet the deficit. The temptation to divide the profits up to the hilt generally proves irresistible, and thus there is no reserve fund to meet any emergency which, when it arises, has to be met by a call upon the shareholders' pockets. There is, thus, on the one hand, the unwillingness to forego the dividend, and, on the other, the dislike of the call, the effect of these contending forces too often resulting in bad mining, in the form of inadequate development, the exhaustion of ore reserves, the continued use of old and antiquated machinery, and sometimes the neglect of proper measures for the security of the mine. It was formerly held that the Limited Liability principle was not adapted to Cornish mining; the old prejudice against any departure from the time-honoured Cost-book system seems at length, however, to be breaking down, and the past year has been signalled by the conversion of Dolcoath into a Limited Liability concern, this mine now becoming Dolcoath (Limited) with its board of directors, managing director, secretary, and all the paraphernalia of a full-fledged Limited Liability company; the modern shareholder, too, having superseded the venerable "adventurer." It is often charged against Cornish mining men that they are extremely conservative in their methods, and slow to advance along the line of progress. I do not think that this charge can be fully sustained. I should not like to argue that they are first to adopt new methods or to introduce new appliances; it would probably be more correct to say that they are sufficiently cautious not to accept novel and costly methods until they have fully satisfied themselves that the new thing is a genuine improvement on the old. If they do not hasten to introduce the most modern and improved appliances, is it not because they have not the means, that they are terribly handicapped for want of funds, and are ever alive to the fact that any such change or improvement means a fresh appeal to the adventurer's pocket?

Is it not, moreover, a fact that when they go to other countries in the service of companies which have ample working capital, they are as ready to adopt modern machinery and improved methods as any of their contemporaries? It is surely a fallacy to suppose that the Cornish mine manager is not as keenly and intelligently alive to the desirability of working on improved lines, and as ready to adopt them as others. You have only to allow him a free hand and to afford him the opportunity. If a comparison be drawn, moreover, between Cornish mining 25 or 30 years ago, and that of the present day, it will be seen that great advances have been made. On the other hand, if we compare our home appliances with those in use on the Continent, it will be seen that we are still far behind our neighbors, especially in the matter of the dressing of ores. The old method of winding by chain and kibble, slow, cumbersome, expensive, and dangerous, has given way to the steel wire rope and skip. The wear and tear of the bed plank and shaft lining by the kibble was enormous; there was also great wear of the chain, and not infrequent breakages, and when it snapped at the surface with the full kibble attached midway in the shaft, it not only often played great havoc with the pulley-stands and other erections along its route, but seriously endangered the lives of the employees on the dressing floors.

It is seldom that the wire rope breaks, for it is comparatively easy to discover in it any signs of weakness. There is, however, no absolute safety even in wire ropes if they are worked and exposed for too long a period, and if the periodical examination degenerates into a mere perfunctory matter of routine, disasters in such cases are only too familiar to us. The modern skip, carrying its load of 1½ tons, compares very favourably with the old "whim kibble" with scarcely a quarter of that load. I am not sure, however, that the popular skip is not destined to be replaced by the more perfect arrangement of bringing the ore to surface direct in the same wagon which takes it from the forebrest or stope to the shaft, as is done in collieries everywhere, and very generally in Continental and foreign metal mines. The ore once tapped from the "pass" or hopper into the wagon underground is trammed to shaft, run on to the cage, hoisted to surface, and trammed straight away to the grizzly, stone breaker, washing trommel, or stamps pass, as the case may be, without any intervening handling whatever. This arrangement does away, moreover, with the necessity for the tip-plate at each level.

It is scarcely necessary to mention the speed with which ground is broken in these days of rock drills and strong explosives as

compared with the old days of hand drilling and blasting powder; the speed now is probably three to five times greater. As an example of what can be done by these modern appliances and agents, it is only necessary to refer to a short paper recently read to us by one of our members on "Deep Shaft Sinking in Lake Superior," where a shaft 15½ by 25 feet was sunk, mainly in hard trap rock, 2197 feet in two years, or at the rate of over 91 feet per month. The shaft, having attained a depth of 4426 feet, was still being sunk at the rate of about 70 feet per month. This is, no doubt, record breaking work, but some splendid examples of great speed have lately been recorded in our home mines, notably at Wheal Grenville, where, for the last 12 months, they have been driving a 7 feet by 6 feet level on the lode in hard tinestone and capel at the rate of 114 feet per month. In the modern dressing floor of our home mines great changes are observable, several old appliances have quite disappeared, and others are seldom used. The treatment of slime ore by the process of *trunking* is now never heard of, and that peculiar form of rectangular buddle,\* which was fed by placing a layer of slime ore on the head-board, smoothing it over, and then, with a straight-sided shovel, cutting it into regular grooves, down which the water flowed, carrying the slimes with it into the buddle, has fallen quite into disuse.

Hand sieve jigging, so general in former days, is seldom resorted to now, having been superseded, first by the lever, or Brakeshaft jigger, and then by the modern machine jigger, which is now universally employed, and has been brought to great perfection. The fact that hand sieve jigging was a most laborious operation, and was an exceedingly slow process, sufficed to render it speedily obsolete on the introduction of the continuous machine jigger. It is, however, an exceedingly useful method for experimental purposes, enabling the mining engineers to test in hundred-weights what he could only do in ounces with the vanning shovel. It is, perhaps, doubtful if there are many mining men, at the present day, who could clean a sample of ore with the hand sieve, or could "settle a sieve," as the operation of jigging a charge of ore was designated. Everyone, however, especially those who visit new and outlying districts in search of the ordinary metallic ores, should understand the operation, and be able to teach the workmen how to perform it. The round buddle, which was a great improvement on the rectangular or "square" buddle, which is still used to a limited extent for treating small quantities, or for final cleaning purposes, is, in one or other of its various modified forms, an established machine amongst us. Its chief drawback is that it is not automatic in discharge; all the contents having to be shovelled out, and handled before the ore is clean and marketable. Just as the Cornish miner has superseded the antiquated operation of *bucking*—i.e., the pounding down of the ore on a smooth iron plate to a more or less fine state by a flat steel-faced bucking hammer; so has the stone-breaker, to a great extent at least, superseded the *ragging* and *spalling* of former days. Ragging consisted in a preparatory breaking down of the larger rocks or lumps of ore from the mine by heavy sledges or hammers, while spalling was the subsequent further reduction to a size suitable to enter the crusher rolls, by women with lighter hammers. This was, of course, a slow and costly way of reducing the large sized material for the crushing mill, as it required a small battalion of hands to supply one or two large crushers. The stonebreaker accomplishes this work with much greater efficiency and economy. The old custom of screening or riddling the crude mixed ore by a hand sieve or riddle† has also been found too slow and cumbersome a method for the present day.

## The Typical Dressing Floor of Former Times.

Some of us can remember when the perfection of dressing‡ consisted, roughly speaking, of the following *modus operandi*:—The crude ore, which has been hoisted to surface generally through an underlie, and too often a crooked shaft by chain and kibble and tipped into the wagon, was trammed from the shaft brack to the floors, preferably over a stage or elevated tramway, and tipped on to the parallel sizing bars; thus would the stuff be at once separated into rocks or large lumps, and smalls. The latter would be further sized by screening through a riddle when the roughs would be hand picked, and the fines jigged. The rocks would be ragged, spalled, and trammed to the crusher rolls. This completed the preliminary treatment. The crushed ore would then be concentrated and cleaned by jigging (hand sieve or lever machine), buddling (in rectangular buddles), tying, stripping, tossing (dollying), or trunking, according to the size of grain—i.e., whether it was a coarse sand, a fine sand, or slimes. Such is a rough outline of the mode of treatment of the ore on the old English dressing-floor.

Let me here remark how convenient it would be if we adopted the continental phraseology in describing the various grades and size of ore stuff, giving the sizes in millimetres instead of our ill-defined terms smalls, fines, sands, rows, and a number of other equally vague terms, to which probably precisely the same meaning is seldom attached in different localities; indeed, it would be a great convenience to mining men if the metric system were introduced into this country.

## The Modern Dressing Floor.

Compare the elaborate and scientific methods of to-day, with the old methods, involving the repeated handling of the stuff, and the immense amount of manual labour. The crude ore having been hoisted through the vertical shaft, with great speed and little friction to surface, is trammed direct to the dressing floor, and automatically discharged on to a grizzly. The larger lumps pass direct to the stonebreaker, thence to the crusher. The smalls go into the washing trommel, where it is cleaned from the adhering clay and dirt, thence into the sizing trommels which grade the ore into sizes varying from (say) 30 millimetres to 1 millimetre; the pieces over 30 millimetres being too large to be jigged, go to the revolving picking table, and are there sorted into milling ore and waste rock. Each grade below this is conveyed to its own proper set of jiggers, where it is concentrated and cleaned. The very fine-grained—that below 1 millimetre (the German miners jig with great success 1½, or even 1 millimetre stuff), and all the slime water from the trommels and jigs pass through a series of Spitzkasten or pointed boxes (settlers), from which the water flows off clear at the end of the series, while the slimes which are deposited are simultaneously drawn off through an adjustable discharge pipe at the bottom, and conveyed to the revolving table ("Rotierende Maschine"), or to the Linkenbach table, either of which automatically and very effectively separates the ore from the waste material. Thus the whole system is automatic from beginning to end, with a minimum of manual labour and oversight, the only handling required being that at the picking table, where the stuff, being too large to be jigged, require to be intelligently sorted.

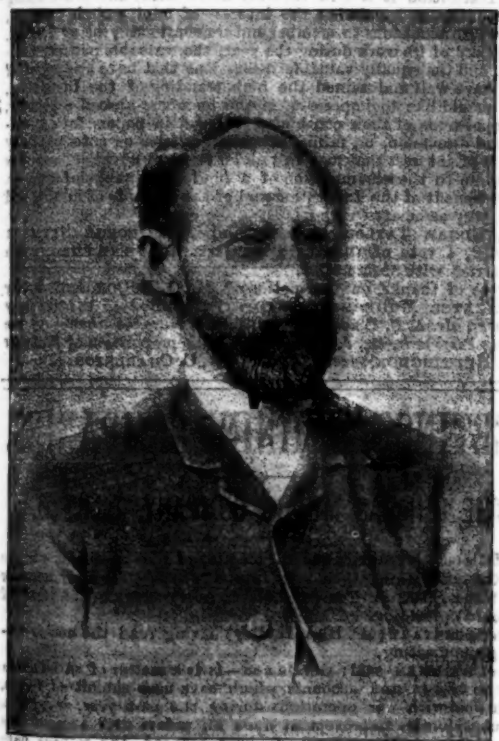
It may be noted that in Germany, where the wet concentration of ores is almost elevated into a fine art, and where dressing machinery and appliances are brought to wonderful perfection, jigging is resorted to for all grades of ore from 30 millimetres to 1 millimetre, while the slime ores are treated by vanners, rotating tables, Rittinger percussion tables, Linkenbach tables, and other continuous acting machines. The Linkenbach table is a development of, or an improvement on, the rotating or revolving table, and is a sort of reversion to the original type. The revolving table has long been in use in Germany, but is now, it is said, gradually falling into disuse in favour of the Linkenbach table. In Cornwall it has, in recent years, been introduced, as a novelty and improvement, under the name of the *revolving frame*. The objection to the rotating table in Germany is that the bed or table being of iron and very heavy, it is very difficult, under the considerable strain to which it is subject, to keep it well adjusted, and working in a true plane. Hence Herr Linkenbach§ introduced a modified arrangement.

\* Sometimes designated the "cutting buddle."

† Sometimes termed a "griddle," and the operation, "griddling." In Cornish.

‡ This refers more especially to the dressing of copper, lead, and zinc ores, which differs in some material respects from tin dressing.

§ Herr Linkenbach, engineer of the well-known lead and silver works at Enns, is the author of an excellent work entitled, "Die Aufbereitung der Erze," in which drawings of the machines and details of its working are given.



JOSEPH GARLAND, ESQ., F.G.S., M.I.M.E.

at his Cornish home: He commenced his practical mining career at the old Wheal Friendship Copper Mine in Devonshire, where, at the suggestion of the late Mr. Richard Taylor, he studied practical mining with a view to an appointment abroad. In fact, it was Mr. Taylor who gave him his first appointment—namely, to the far-famed Cape Copper mines, in the year 1863, and this was the prelude to a successful career in the various capacities of mine agent, manager, or inspecting engineer. He has either reported on or worked mines in almost every mineral country in England and Wales, in several districts in France, Italy, Germany, Switzerland, Portugal, Spain, and Norway; whilst abroad he has visited the United States, Australia, South Africa, Mexico, and New Caledonia. He has been connected with lead or silver properties in Wales, Germany, France, Switzerland, and Colorado, and with copper mines in Devon, Germany, Spain, Portugal, Italy, Newfoundland, and Mexico, whilst his acquaintance with gold properties includes Victoria, Colorado, and Italy. Throughout the greater part of his career Mr. Garland has been connected with the eminent firm of Messrs. John Taylor and Sons, and during the last 10 years has been associated with them in their London offices, and as inspecting engineer, in which capacity he has recently returned from a mining tour in Mexico, and is now about to leave for Australia on an important mission. Mr. Garland is a Fellow of the Geological Society, and a member of other scientific institutions, and has been from the first connected with the Institution of Mining and Metallurgy as a member of the council, and now as President. He has also been a frequent contributor to the literature of mining, a number of papers on various phases of the industry having come from his pen, many of which have been published in *The Mining Journal*. Mr. Garland's address was as follows:—

## PRESIDENTIAL ADDRESS.

My first duty is to express to you my warmest thanks for electing me to the position of President of this Institution. I am deeply sensible of the honour you have thus conferred upon me, and if I fall short of those qualities which you have to make a successful President, and which have been so conspicuous in my predecessors, I can, at least, claim an equal interest with them in the prosperity of the Institution, and a disposition to at all times promote its welfare and success to the best of my ability.

In considering the nature of the address I should deliver to you on this occasion, I have determined to confine myself to the conditions of mining in this country, and the evolutions in the methods pursued and the appliances used, which have fallen within my own



The Linkenbach table, the surface of which is of cement, is fixed, while the feed pipes, sprinklers, and jets revolve; the diameter is generally 6 to 8 metres, but may be 10 to 12 metres. These machines work very smoothly, do excellent work, and do not easily get out of repair. The only defect worth noticing is that the rotating feed pipes, jets, &c., are suspended from rods attached to overhead cast-iron arms; this makes the rotating part of the machine a somewhat heavy and cumbersome contrivance, but does not militate against the effective working of the machine. This defect appears to have been very effectively overcome in the *Humboldt Improved Linkenbach Table*, in which the revolving spray and washing-off pipes are attached to a hollow vertical shaft, through which flows the clean water required. In addition to the above-mentioned machines, there are several others which are used to a lesser extent, such as the various types of the vanner, and the Rittinger percussion table, but since the introduction of the Linkenbach table, which deals with large quantities, and does not require such careful supervision, they are gradually falling into disuse. The foregoing sketch of the successive steps in the treatment of the metalliferous ores on the modern dressing floor makes no pretension to include all the processes and machines employed, or to be anything more than a bare outline. It is especially noticeable that greater attention is now paid than formerly to the important question of the treatment of slimes, and deservedly so, for vast quantities of good material have been thrown away on the waste dump, or into the waste stream, for want of adequate means to treat and recover them. It is, moreover, interesting to note that there is in these modern days a decided tendency to introduce labour-saving appliances and automatic and continuous acting machines.

Our cursory sketch of Cornish mining may be supplemented by a further brief reference to the queen of the western mines—Dolcoath.

#### Dolcoath Mine.

This famous old mine, the deepest and richest in Cornwall, has had a remarkable history. It was worked in the last century, how far back is not known, as accurate records extend back only to 1799, when the Cost-book company, which in June last was converted into the present Limited company, commenced its career. The property was at first worked as a copper mine and afterwards as a tin mine, and, as we learn from the experienced and capable managing director, the company produced copper ores of the value of £2,328,435, tin ore of the value of £3,572,179, and cobalt, silver, and arsenic ore of the value of £23,153, or a total bordering on £6,000,000. Down to 1836 dividends were paid amounting to £157,542; from that year to 1853 there were no dividends, this being the transition period from copper to tin. In 1853 dividends were resumed, and continued almost uninterruptedly down to a recent date, the total amount paid in this latter period being £756,188. Thus, the now extinct Cost-book company paid in dividends during the 86 years of its existence £913,730, the total calls for the same period being £45,250, that is to say for each £1 called up £20 were returned to the adventurers in the shape of dividends. It will be of special interest to the younger members of this Institution to know that this mine, which was very rich in copper ore above the 130 fathom level, has below the 180 fathom level ceased in a great measure to produce copper, and has become the richest tin mine in the county.

The present deepest level is the 440 fathoms† below adit. At this depth the full width of the lode has not yet been determined, but it has already been cut into for 15 feet, and yields tin ore worth £50 per cubic fathom. In the next level above, the 425, the lode was 24 feet in width.

This is a noteworthy case of a lode becoming wider and richer the deeper it is explored. The new company has lost no time in commencing a new vertical shaft to come down on the lode at a depth of 3000 feet, or about 420 feet below the present deepest level. As it is intended that the best and most approved methods shall be adopted in the execution of this work, it will be interesting to mining men to note the rate of progress with which the work will be accomplished.

#### Mining Engineers.

In considering the position of the mining engineer of the present day, there are not wanting evidences that the profession is rising in public estimation, and in this reference I allude to the mining engineer who combines in himself the qualifications of the practical miner with a knowledge of the theory and science of mining. He is better trained, and commands a higher and more lucrative position than formerly. He has discovered that the mere practical qualifications which sufficed in earlier days do not meet the requirements of the present time, when he is often called upon to superintend large establishments abroad, comprising mining, smelting, milling, accountancy, and commercial work, or to inspect and report on mining properties or to act as consulting engineer. We do not hear so much in these days of the "practical man." Time was when he was considered the only person who possessed the necessary qualifications for directing the operations of a mine, and when the "theoretical man," with a knowledge of the theory of mining, and of the sciences that come into play in that profession, and having a limited experience of actual mining, was regarded as unfit for assuming the responsible duties of a mine manager. Times have changed, and it is a notable fact that the most important and responsible positions in mining are more and more falling to the scientifically trained man, while the purely practical man who lacks that training is gradually assuming secondary position. While pointing this out, however, as a sign of the times, it must be recognised that the practical man has great and increasing scope for the exercise of his talents, and will continue to play an important part in the prosecution of an industry in which his skill and experience will always be indispensable. The higher positions and prizes of the profession are, however, undoubtedly within the reach of the qualified miner, even though he has not had the benefit of the course of teaching and training that a mining school affords, but all those who aspire to these positions should take care to acquire a good knowledge of those practical sciences that are so useful in the pursuit of mining. It is scarcely necessary to insist that the mining engineer should be an ardent student and a close observer, for, as has been before pointed out from the chair, his business is never thoroughly learnt and mastered. There is always something new to be acquired, some geological or mineralogical feature in the rocks or minerals which he encounters with which he is not familiar, or some point in the practical working of the mine he visits which he has not noticed before; some modification of old appliances, or some new contrivance which has not suggested itself to his own inventive faculty.

His note book and sketch book should ever be at hand, and a phrase book, in which to jot down any mining terms which may be new or strange to him, would be found to be extremely useful. It has been suggested that this Institution should undertake the compilation and publication of a Glossary of Mining Terms. I am sure that by so doing it would render a great service to the members, as well as to the mining public, and I am equally sure that it numbers amongst its members many who are fully competent to carry out such a work. It is, I think, in a great degree, because of the ever varying character of mineral deposits, and the scope which mining affords for every one's abilities and tastes, whether they be scientific, mechanical, or literary, that makes mining one of the most interesting of occupations and fascinating of practical studies. The mining engineer has opportunities for collecting a store house of facts appertaining to the relation between certain rock formations and the mineral veins which traverse them, as, for example, he learns that tin lodes occur in granite, copper lodes in killas, lead lodes in limestone, and so on.

Again, it is an interesting study to observe the effect of change of strata on the bearing, character, and productiveness of lodes; the enriching or sterilising effect of dykes, crosscourses, and

slides; the phenomena of junctions, bifurcations, and folding of veins, and the peculiar and abnormal character of irregular deposits. There is further scope for his energy in bringing about systematic and more economical methods of working, for it often happens that even in gold mines no regular assays are made of the ore passed through the mills, or of the tailings from the reduction works, and consequently no accurate knowledge of the loss of the precious metal is arrived at. It also frequently happens that no record or account is kept of the cost of each department of work in relation to the quantity of crude ore treated, or the tons of marketable ore produced.

To give a case in point, I examined a number of mines not long ago where such a want of system was only too obvious, for while a record was kept of the total quantity of ore obtained from a group of mines, and the cost of mining, dressing, transport, &c., was carefully kept and worked out at per ton of dressed ore, the huge blinder was committed of grouping together all the mines producing the same metal, and thus while the result of working the whole group was apparent, there was no evidence as to whether each individual mine was making a profit or a loss. It is undoubtedly a fact that a careful and systematic analysis of working costs and outlays goes a long way towards economic working, and it is equally true that ignorance of the details, and of the precise channels into which expenditure flows, leads to serious leakage and extravagance. There are one or two points in connection with the opening up of mines in depth which, I think, may fairly be considered, as, for instance, whether it is advisable or economical to extend the main drives or levels at regular distances of 10 fathoms, or 60 feet, in the old orthodox way, or whether this should not be governed by the character of the lode at different points. I have observed that in the Indian mines the levels are seldom less than 80 feet apart, and are often as much as 100 feet apart. I am not aware of any serious objection to this system; indeed, it may be that there is a distinct advantage in it as the ground between the levels can often be stoped away at one-half the cost of driving. Then, again, there is the practice of placing winzes and rises at short distances apart, the object being, of course, to furnish more points of attack, or more available points for stoping, and here it would seem that, unless ventilation or some other good reason rendered it necessary, the method being expensive should be avoided, as the same ground could be stoped at much less cost.

I have alluded above to the peculiar character of "irregular deposits," and think it may be interesting to refer to one or two noteworthy examples, with which the members will not be altogether unfamiliar. The Rio Tinto, Cape Copper, and Tilt Cove, all of which I have visited, are mines of which the leading characteristics is the irregularity of their mineral deposits, and where the fissure vein finds no place. I will deal briefly with the two last mentioned. At the Ookiep Mine, which is the chief of the Cape Copper group, there is an enormous deposit which has yielded and is still producing very large quantities of ore of high grade. The geological formation is locally known as granitic; the country rock in the immediate vicinity of the deposit is gneiss, with occasional patches of mica-schist. The general trend is east and west, with a slight northerly dip.

The ore body being very irregular in outline, its exact area or dimensions cannot be given, but its greatest length, so far as developed, is about 1500 feet, and its average breadth, roughly stated, is about 240 feet, widening out in places to about 460 feet. These dimensions are not maintained in depth. The mine is now 780 feet deep, but the main ore body appears not to extend much below 550 feet. Bands of barren rock, chiefly quartz, occur in the deposit, but on the whole it has been enormously productive, the chief ores being copper pyrites of over 30 per cent., erubescite of 50 to 55 per cent., whilst there are smaller quantities of rich sulphides of over 70 per cent., some chrysocolla, and other varieties of copper ore. At present the ore shipped to England averages about 25 per cent.; the remainder, assaying about 12 per cent., is smelted in blast furnaces on the spot into a matte of about 50 per cent. copper. It may briefly be stated, as showing the remunerative nature of these deposits, that since the company commenced its mining operations in 1862, and during the 33 years to 1895 the yield of ore from the two chief mines has been 494,589 English tons, the bulk of which was produced by the Ookiep Mine; the value of the ore was £6,890,159 sterling, the working expenses being £4,732,980. Since 1868 there has been a regular and unbroken annual distribution of profits, the total amount actually paid in dividends from 1864 to 1895 being £1,929,025 sterling. At the Tilt Cove Mine, in Newfoundland, there is also a remarkable deposit of cupreous iron pyrites, somewhat resembling that of Rio Tinto.

According to the geological survey, "the structure of the surrounding country is of a most complicated character, the rocks consisting for the most part of slaty bands, interstratified with diorites, dolomites, and serpentines." A distinct feature of the formation is the large proportion of steatite which occurs in immediate contiguity to the ore body, especially in the deeper workings. The deposit which was first laid open by a tunnel or adit level, 450 feet in length, was, in the shallow workings, 300 feet by 200 feet in horizontal extent; it has been worked to a depth of 120 feet below the adit; the area gradually lessens in depth. The ore is a hard, close-grained, yellow pyrites, containing about 4 per cent. of copper, and about 1½ dwt. of gold per ton. The mine has been regularly worked since 1888, and has given a total production of 370,469 tons, the output still amounting to between 60,000 and 70,000 tons of ore per annum. A large proportion of this is treated on the spot by the "pyritic process," and a regulus produced containing about 8 per cent. of copper. The ore brought to England is first burned for acid, and then smelted into regulus of about 35 per cent., from which the gold is extracted by a simple process.

#### Gold Mining.

In regard to gold mining, it is impossible to ignore the fact that it has in the present day taken the most prominent position, and placed the exploitation of the common metals completely in the shade. It would be impossible within the space left at my disposal to take anything approaching a comprehensive survey of gold mining and its recent developments, and I propose, therefore, to limit my remarks to some interesting features in connection with the *Colar Gold Field*. Much information can be derived from the detailed and well written reports that are so regularly circulated, but it is to be regretted that no work has yet been published in this country on Indian gold mining, such as, for instance, the comprehensive and excellent work recently brought out by Messrs. Hatch and Chalmers, on "The Gold Mines of the Rand." A distinguishing feature of this field is the vast number of old workings, and evidences of ancient mining that are met with. These indicate generally the lines of reef, and several distinct lodes have been discovered thereby along the surface. Some of these have only been slightly costeaned or trenced; others have been prospected to a limited depth; while a few have been worked to a depth of 200 or 300 feet, and all have been found gold-bearing in some degree. The main lode of the district is that known as the "Champion reef," which traverses the so-called Dewar schist for a great distance. Its strike is nearly north and south, and its dip is westerly. The quartz veinstone is generally auriferous, and rarely quite barren; there are, of course, patches, and sometimes extensive ones, of a non-paying character. The pay ore occurs for the most part in shoots, which have a northerly trend and dip; sometimes they are 1000 or more feet in length, and in places they are limited to (say) 50 to 100 feet; but I think it may be stated that the larger shoots are more frequent. It is difficult to state what is the average width of the lode, which varies from 1 foot to 6 feet, while at times it contracts to 6 inches or less, and now and again opens out to 18 or 15 feet.

The assay value of the reef varies from a few pennyweights up to several ounces per ton, and the quantity of gold it yields under treatment is sufficiently indicated by the results obtained by two of the leading mines whose reports have just been issued for 1895; in one case an average of 1 ounce 6 dwts. 14 grains per ton, and in the other an average of 1 ounce 6 dwts. 22 grains having been obtained. A remarkable character of the Champion reef is its

persistence in length and depth. Until all the mines on its course have been opened up it is impossible to determine its length; but taking the contiguous mines which have been developed up to the present, the length already opened up is one practically unbroken line of 18,300 feet, or 3·46 miles, and this includes shoots of pay ore amounting in the aggregate to no less than 13,740 feet—that is to say, 2·6 miles have been found to yield pay ore at varying depths.

Running roughly parallel with this reef at surface is a very large basaltic dyke some 80 feet in width. The famous Mysore Mine was worked to a depth of about 780 feet at the east of this dyke, when the lode was cut off by it, the lode then underlying about 31°, while the dyke was nearly vertical with a slight dip eastward. The lode which in the shallower levels had an underlie of about 50°, had flattened to 40°, then to about 31°, as stated. The shaft was continued through the dyke at the same angle as before, and the lode was recovered on the western side, but had, apparently, suffered an upthrow of about 50 feet. The flattening observed above was found to continue for some distance. Below this point the lode has been worked continuously down to the 1520 feet level. A remarkable feature is that the lode in the levels west of the dyke, on being followed northerly, was found to make a decided bend eastwards until it once more came into actual contact with the dyke in each level. On piercing through the dyke the lode has again been found at each level on the east side, and an excellent mine is now being developed there. One other feature of the Champion Reef may be briefly noticed—i.e., the peculiar horizontal folding to which the lode has been frequently subjected. In following the lode northerly, for instance, a sharp bend is met with, the lode doubling back on itself; this, on being followed southward for a great many feet, sometimes 100 or more, presently leads to another sharp bend back again northward, and thus a double fold not unlike the letter S is formed, and the branches or limbs of the fold are often found to be very rich. Thus, for instance, without giving actual figures, it may happen that the western, middle, and eastern parallel branches may each be 2½ or 3 feet wide, and each yielding 2 to 4 ounces of gold per ton, and thus these folds, as a rule, turn out to be a deposit of great value. It may be mentioned that any given fold generally reappears in the deeper levels, but further north, thus agreeing with the shoots of ore in having a northerly dip. I will not pursue this subject any further, but simply close my observations on Colar gold mining by saying that it continues in a most satisfactory and increasingly promising condition, and that there is every prospect of its being a permanent as well as highly profitable industry.

#### Conclusion.

In concluding my remarks I must congratulate the members upon the success of the Institution, both in regard to the constantly increasing number of applicants for membership, and to the work it has accomplished. It is a gratifying feature that there is an ever-growing interest in the Institution which is evidenced by the fact that the accepted proposals during the past year have been no fewer than 77 as compared with 49 in the previous year, and that in the short time the Institution has been in existence the number of members, associates, and students have reached a total of 372. As an Institution it is now securely established, and is attracting the attention and claiming the interest of mining circles abroad, from which accessions to membership are continually being derived. The record of its work during the year, the valuable papers contributed, and the equally valuable discussions that have arisen out of them, have well maintained the high standing of the Institution, and I should like to impress upon the members abroad especially, the importance of their continuing to send in papers for publication and discussion, or, failing this, short articles or notes upon any matters of interest that may fall under their observation, and thus contribute to the accumulation of a fund of valuable information for the benefit of the Institution and of the students of mining and metallurgy associated with it.

Mr. EDGAR TAYLOR proposed, and Mr. GEORGE SETMOUR seconded, a vote of thanks to Mr. Garland for his address, which was carried with acclamation.

A vote of thanks, on the motion of Mr. G. H. COX, seconded by Mr. WALTER McDERMOTT, was also accorded to the honorary treasurer, Mr. A. C. CLAUDET, and a further vote of thanks to the retiring President, Mr. J. H. COLLINS, on the proposition of Professor A. K. HUNTINGDON, seconded by Mr. A. C. CHARLETON.

## MEETINGS OF MINING COMPANIES.

### THE CHIAPAS MINING COMPANY, LIMITED.

THE seventh ordinary general meeting of the shareholders in the Chiapas Mining Company (Limited) took place at Winchester House, E.C., on Tuesday, Mr. E. A. PONTIFEX (Chairman of the board) presiding.

The SECRETARY (Mr. H. A. Hedley) having read the notice convening the meeting.

The CHAIRMAN said: Gentlemen—It is a matter of satisfaction that the report and accounts which have been submitted to you, which deal with our operations during the past year, manifest a very considerable improvement upon all points over those of the previous one. The costs have been reduced, the returns have somewhat increased, the development of the mine has proceeded with very satisfactory results, and we have earned a much larger profit, notwithstanding that the price which we have obtained for our ore has been lower during the past year than in the preceding one. This lower price is due to the further fall in the price of copper, and the somewhat lower gold assay of our concentrates. The expenditure on revenue account shows a reduction of £3400 upon the previous year. We produced 719 tons of concentrates in 1895, as against 708 tons in 1894, in addition to which we obtained 1157 ounces of separated gold. The gross receipts show an increase of £2051. The reserves of ore laid open in the mine have increased, in round figures, from 11,000 tons in 1894 to 15,000 tons in 1895. The lower price obtained for our concentrates was more than compensated for by the saving in gold effected by the means of the 10 stamp battery, which we erected for the purpose of treating the tailings. During the six months the saving in gold thus effected amounted in value to £4058, which was obtained from the retreatment of 3677 tons of tailings. The profit on the retreatment of tailings has, therefore, averaged a little over £1 per ton. You must remember that these stamps were only at work for six months of the financial year, so that if they had been working for the whole of it, they would have earned a profit of over £7000. From this it follows that 30 stamps, when erected, should effect a saving of over £30,000 a year, in addition to the profits which we shall obtain from the roller mill. This is a very considerable saving from what was at one time a waste product. The reduction in the mining and other costs, to which I have alluded, amounts to the sum of £2406. But as the expenditure for the year includes an increase of £1072, under the heads of development work, ore extraction, and the cost of working the stamp mill, which latter did not appear in the last year's accounts, the saving on a true comparison of the two years in the cost of working amounts to £3478. We have expended during the year the sum of £4228 on new plant and buildings, which has been mainly the cost of the erection of the 10 stamp mill, and the new water power installation, together with the compressor plant for working the pumps and drills. As pointed out in the directors' report, the profits made during the past year have enabled them to discharge the loan of £3600, which was obtained from our commercial agents, and has in addition provided for the payment of the further amount of plant and machinery supplied, the value of which amounted to £4228, and they have also enabled us to effect a substantial saving in our financial arrangements with Mexico. Your attention was called last year to the unsatisfactory feature attending to the withholding of dividends for the purpose of providing

\* A good working specimen of this improved machine, as well as examples of almost every recent and approved dressing appliance, is to be seen in operation at the Humboldt Works, at Kalk, near Cologne.

† Equal to about 2580 feet, or just 60 feet less than ¼ mile in vertical depth.



additional working capital. To obviate this we invited you to subscribe for a further amount of the unissued capital, but the invitation was so inadequately responded to, that the few applications which we received were not accepted, and no further allotment was made. I fear, therefore, that it will not be useful to again urge upon you that you should furnish us with the means for the more energetic development of your property, but it is my duty to point out to you that there still remains of the unissued capital the sum of £29,043. On this sum a preference dividend of 10 per cent. per annum attaches to £20,252 of it, as only £9,748 have been subscribed for out of the £30,000, to which a preference was attached. Mr. McCarthy, our late mine manager, on page 31 of his report, points out that it is unreasonable to suppose that the ore bodies, extensive as they have proved to be, should hold out much longer above water level, and he strongly urges, as I have had occasion to do on two or three occasions, the necessity for providing the means for deep sinking. We may, with some confidence, expect that we shall obtain the means to defray the costs of this out of the profits which we may earn during the present year, but I must again remind you that this will have the effect of further retarding the distribution of dividends. The payment of capital expenditure out of revenue is satisfactory from one point of view, inasmuch as it will redound eventually to the advantage of the shareholders, by reducing the area of capital over which the future dividends will have to be paid, but this consideration is one which would appear to be too little for the benefit of the present shareholders, and too much to the advantage of their successors. It rests, however, with you to adopt which of the two courses you prefer. Mr. McCarthy, in his very clear and comprehensive report, goes so minutely into all the mining details, and tells us so clearly in what direction and to what extent the developments of the mine have been proceeded with, that it is unnecessary for me to weary you by recapitulating what he therein states. I will only point out that, on the Providencia side of the property, encouraging as our prospects there were last year, they are infinitely more so now, and we have what I think I may fairly describe as a reasonable assured supply of ore for some years to come. Mr. McCarthy doubtless speaks very conservatively on this development, and he takes no account whatever, and properly so at that time, of the appearances in San Juan drift and crosscut, where the prospects improve almost from day to day. In a letter dated January 15 of the present year, our superintendent, Mr. Dietrich, writes, with reference to the San Juan extension, that we have risen 8 feet in an inclined direction at the end of San Juan extension, following the ore upwards. This rise is producing ore assaying: gold 1 ounce, silver 24 ounces, copper 119 per cent. And he tells us later that in the month of January they had driven a further 6 feet in very good ore, much of which was rich enough to be picked and bagged without being crushed and washed. It forms an extension of our workings going into the hill where we have the largest amount of territory to work. It lies on the other side of the creek to that on which our original mining operations were conducted, and is in the best and most favourable position for our future workings. In regard to the older workings on the Santa Fé side of the creek, although during the past year the quantity raised there has not been so large as in the year before, this is due to the fact of the surface levels having been mainly exhausted, but there is no reason to suppose that we shall not again find good ore in depth on this as well as on the Providencia side. In point of fact, recent explorations would indicate that the deposits on the two sides of the creek are connected in depth, so as to form practically one large deposit. In addition to this possibility of finding further ore in depth, on the Santa Fé side, a discovery has lately been made on this portion of the property, which may prove of considerable importance, consisting, as it does, of a mass of low-grade quartz rock carrying gold of from 4 to 7 dwts. to the ton. This is a different formation to the rest of the deposit (which is in wollastonite, and carries copper and silver as well as gold). The new discovery is in quartz rock, carrying substantially gold only, and though it is of low grade, it may be capable of being worked to a profit, seeing that we have a cheap motive power in the opportunity we possess of bringing in a large water supply. In a report just to hand, we are told that they have passed through some 30 feet of this ore, that it is fair free milling ore, assaying gold, 7 dwts. 12 grains, and appears to be a very extensive deposit. Our past experience removes all apprehension as to our means of transport. It must, however, I fear, always remain too costly to pay for the carriage of any but concentrated ore. Fortunately, our produce is of a nature which admits of such concentration, though this concentration is obtained at some considerable loss of mineral in the tailings. Our constant attention is being directed to the diminution of such loss, and, to that end, we last year engaged the services, at a high salary, of a very experienced foreman dresser from the United States. He was, however, unable to improve upon our own results, and we, therefore, did not renew his engagement. Possibly the solution of our difficulty may be found in the partial smelting of our produce, and if coke could be got to the mine at any reasonable cost, this would be easy. Unfortunately, the only fuel obtainable, and that at considerable cost, is wood, which makes smelting by blast furnaces impracticable, and will necessitate the use of reverberatory furnaces, which is a much more costly process. It is, moreover, not certain that the only fluxes which are obtainable are suitable to the reduction of the metals, but that is a question which we are about to solve by treating a parcel of ore in this country. No pains shall be spared to extract from the ore the greatest possible portion of its valuable contents, but even if we are unable to improve upon our present working, it will still leave a very handsome profit on every ton of ore treated.

Mr. J. W. SKELTON seconded the resolution. Replying to questions asked by various SHAREHOLDERS, the CHAIRMAN stated that there was no space available at the mines for the storage of another ton of tailings. In regard to the question of fuel, wood was the only material they had at hand. Charcoal could not be made cheap enough for them to use it. The advisability of increasing the capital was purely a matter for the shareholders themselves. They had sufficient to work the mines on the profits realised, but not enough to enable them to pay a dividend as well.

Mr. MATTHEY urged the directors to carefully consider whether in the end charcoal would not be the cheapest fuel for them to use. He believed that in a short time the natives would supply them with as much as they would require at a very low rate.

The CHAIRMAN replied that charcoal could not be used in the blast furnaces.

Mr. MATTHEY maintained that it could, and was invited to co-operate with the board in the matter.

Mr. MUNDAY complained that the directors' fees—£850 a year—were too high, in view of the fact that the shareholders had not yet received a dividend. Then, again, he thought they paid too much for the mine—£160,000—and suggested that the vendors should be asked to surrender a portion of their shares.

The CHAIRMAN said, had the directors have had the means to develop the property as it should have been done, he believed handsome dividends would already have been declared. He thought it highly probable that a dividend would be declared in the course of the next year.

The resolution was agreed to.

Mr. C. G. HALL moved the re-election of Mr. E. A. Pontifex as a director, and testified to his abilities to discharge the duties which devolved upon him. As to the remark which had fallen from a shareholder urging the desirability of changing the constitution of the board, he himself was quite willing to give way to a more capable gentleman, but did not think they could do better than reappoint their Chairman.

The motion was seconded by a SHAREHOLDER, and carried by 11 votes to 4.

The auditors, Messrs. Monkhouse, Goddard, and Co., were also re-elected.

Mr. MUNDAY moved: "That having regard to the demonstrated results of the working of the mine, the directors be requested to appeal to the vendors to surrender a substantial number of their shares."

Mr. MATTHEY seconded the resolution.

The CHAIRMAN said he was afraid it would be a hopeless task, but the board would represent the views of the shareholders. The motion was agreed to.

Mr. MONGER further proposed: "That as from September 30, 1895, the fees of the directors be fixed at a sum equal to 5 per cent. of the profits available for distribution amongst the shareholders."

Mr. MATTHEY said in view of the prospects held out by the Chairman, he thought no action should be taken this year in regard to the directors' fees. (Hear, hear.)

The motion was then withdrawn, and the meeting terminated.

## KAPANGA GOLD MINING COMPANY, LIMITED.

The annual general meeting of the Kapanga Gold Mining Company (Limited) was held on Tuesday, at Winchester House, Mr. HENRY WILSON (the Chairman) presiding.

The SECRETARY (Mr. W. J. Lavington) read the notice convening the meeting.

The CHAIRMAN said: Gentlemen—The first resolution which it is my duty to propose is:—"That the directors' report, as circulated, and the balance-sheet and statement of accounts, as duly audited, be received and adopted." Before formally putting that resolution to the meeting, there are a few minor details which it is usual to deal with on an occasion such as this. It may be as well if I commence with the balance-sheet. As regards the accounts, which have reference to New Zealand, they have been carefully audited by our auditor, who is present, and a voucher for the expenditure of every item included in that statement has been before him, and approved. The expenditure on coal during the period to which this report and statement of accounts has reference, has been somewhat in excess of the previous year. It has been rendered necessary in consequence of the operations in connection with the sinking of Larnach's shaft from the 600 feet to below 800 feet, at which it is now; but I am happy to tell you that the price of our coal is still a very moderate amount, being only at the rate of 14s. 6d. per ton. That price compares favourably with some mining centres with which you may be familiar, as they have to pay as much as £3 per ton. You will also observe an item of £1810 under the head of Coromandel section, and £1946 for Blagrove's section. That expenditure was incurred before the sale of the Blagrove's freehold and the Coromandel—now the Hauraki—took place. You will observe that we receive regular payment of the subsidy given to us by the New Zealand Government. In order to encourage deep mining, and looking as they do upon the Kapanga as the pioneer mine of New Zealand, the Government gave us a subsidy of 10 per cent. towards sinking a shaft and proving the country down to 1000 feet. The amount we have received from the Government for this purpose is £597. The directors' fees amount to £512 10s., which is the usual sum. The next item is the payment of half-transfer fees to facilitate the registration of transfers. The auditor has very properly drawn your attention to this in a footnote. The additional duties imposed upon the board in consequence of the enormous amount of business being done in your shares were such that we could not get through the business, and, in order to maintain the reputation which our office enjoys of being prompt in issuing new certificates, we were obliged to appoint a special officer to examine the old certificates, transfers, and share register before canceling the old certificates, and to put the certificates in perfect order. The amount paid for secretary, office rent, auditor, printing, stationery, &c., is only £300, which is a very moderate remuneration considering the service given to us. With regard to the item travelling expenses for Captain Hodge, before Captain Hodge consented to go to New Zealand it was necessary that we should have various interviews with him, and he was obliged to come up from his country residence frequently, and, of course, we paid his travelling expenses. As to our mining prospects, you may remember that some practical mining men expressed the opinion that there were various points in the mine which might be worked with vigour, but which, for the time being, were latent. There was a very justifiable cause for that. At the time that remark was made we did not enjoy the success that resulted from the formation of the two subsidiary companies. As soon as we were in possession of funds there was not a single point of your property the development of which promised satisfactory results that was not immediately attacked. The various points of operation now are the 300 at Scott's, the 420, the 500, the 600, and the 800, as well as Corby's shaft, which has recently been cleared out, re timbered to the bottom of 200 feet, and from which a drive is now proceeding with a view to getting under the Albion shoot of ground, in the hope of cutting the Kapanga reef there. At this point it may be well to put you in possession of the latest information received by cablegram on the 14th inst. It is as follows:—"During the week the shaft has been sunk 6 feet. The reef in the shaft is 6 inches wide, worth 19s. 6d. per ton (say 6½ dwts.). Judging from the appearance of the country I think we shall soon intersect another lode. The vein in the rise above the 800 is 12 inches wide, worth 52s. per ton (nearly 1 ounce), and shows signs of improvement. At the 500 the width of the reef is 4 feet. We are getting a little gold from the stopes in the 420 feet. Developments promise well at the 300 and 200. At Corby's everything is in good working order. We are now opening up a reef. Certain indications lead us to believe a favourable result may be looked for shortly in the surface workings. We are getting a little gold from throughout the mine. Conditions and prospects of the workings are most encouraging." It is important to note that there is scarcely a point of development in this mine at present at which there is not more or less gold; in some instances a very great deal. The objective point of our operations now is the determining of the value of your mine at depth, and that is being done by continuing the deepening of Larnach's shaft, which is now down 912 feet. Until within the last two or three months the progress made in sinking that shaft was not very rapid. Now it is fairly good (being equal to a fathom per week) considering the depth of the shaft. Referring to the underground workings, Captain Argall, who never exaggerates anything, says in his report:—"Early in the year Larnach's engine shaft was sunk a further depth of 12 feet, making a total depth of 803 feet. The country rock is hard andesite. At the 800 feet we have cut a chamber and driven a crosscut west 700 feet, with the intention of intersecting the supposed junction of Scott's and the Kapanga reefs. The country rock for the entire length of crosscut is blue andesite mixed with jasper and carrying a little pyrites. While driving the crosscut, and when 50 feet from the shaft, we intersected the reef that was cut in the 700 feet, which is 15 inches wide, composed of quartz calcites and pug, and carrying well-defined walls, bearing 25° west of north, underlying to the south-west at an angle of 65° from the horizon. When about 250 feet from the shaft another reef was intersected, about 10 inches wide, its composition being quartz and pug, mixed with country rock, carrying good walls, and bearing north-east 15°, dipping west about 45° from the horizon. A third reef was intersected running about north and south, dipping to the east 10° from vertical, 9 inches wide, composed of solid quartz highly mineralised. About 15 feet west of this reef a strong lode was intersected, 2 feet 6 inches wide, dipping west about 20° from vertical, and bearing 20° east of north; it has a very masterly appearance, with well-defined walls composed of quartz and pug, also carrying a little gold. Several small branches were cut during the driving in addition to the reefs referred to. The lode mentioned above is a fine body of stone carrying traces of the precious metal, and is in all probability the Kapanga reef with its underlie changed. We are putting a rise up, and it is our intention to carry it through to the 600 feet crosscut, in order to determine if possible whether the reef in the 800 crosscut is the Kapanga or not; if our surmise should prove correct we shall hole to the winze sunk in the bottom of the 600 crosscut on the Kapanga, which we had to abandon through the influx of water. The rise, when completed, will not only settle the above supposition, but will be the medium of obtaining good ventilation, and also facilitate exit for the miners. About the middle of February the diamond drill engine was erected, and the shaft tabed to the 800 feet, since when we have bored 193 feet below the bottom of the shaft. For the first 35 feet we passed through the

same class of rock as we found in sinking the shaft—namely, hard andesite; below this we came upon the decomposed andesite, which is the recognised gold-bearing strata, often carrying heavy deposits of the precious metal; this class of rock has continued to the bottom of the bore hole, and is highly mineralised. About 170 feet below the 800 feet we intersected a reef about 7 feet wide, carrying gold, and by the character of the country around must prove to be a very productive reef. This view is supported by the fact that while sinking from the 600 feet to the 800 feet a complete network of stringers was cut through, and these in all probability will strike the reef above referred to, in which case the shoots of gold should be very rich, as this class of rock is the best I have seen in the mine, and under similar conditions I have never known it to be unproductive." That is the position of the property explained to you as clearly as possible. You will observe that we are now operating upon some eight or nine different points of the mine with every prospect of success. Perhaps I may be permitted to point out to you with a feeling of satisfaction the marketable value of your shares at the present time. You will remember that when the company was reconstructed it was on the basis of £1, 18s. 6d. credited as paid. You have paid 1s. for each of the shares you possess; there remains a liability of 6d., and the marketable value is about 10s. 4d. per share, so that those who associated themselves with it in the earlier stages when it was more of an experiment than it is now, have no reason to complain of their investment. Your property is absolutely free from those political influences which prevail in some mining centres of the world by which most serious disturbances have taken place. Considering also the natural facilities which this company enjoys for carrying on the pursuit of mining, and the great flood of money which now inundates the City of London, it is a matter of surprise to me that the shares of the company are at the present low price. My own impression is that they ought to be higher; at all events, there is a combination of favourable circumstances which I think ought to inspire shareholders with confidence in the future of the enterprise with which they are associated, and I venture to think that you will not require to wait long before you receive a fulfilment of the forecasts which have been made by experienced and thoughtful men as to the value of the property you possess. You will have no doubt observed by the balance-sheet the amount of cash received by the sale of the Coromandel property, and also of the Blagrove property, the former being £23,750, and the latter £37,500. The shares of the Blagrove Company are of a nominal value of 2s. 6d. each. They are merely taken at that value in the balance-sheet, whereas they are now worth about 4s. 2d. At all events, they stand in value at about £10,000 more than they appear in the balance-sheet. (Applause.)

Mr. F. G. LANE, in seconding the motion, stated that the shareholders had received a dividend equivalent to 4s. a share by the distribution amongst them of the Hauraki shares. Operations at the mine were now on a more extended scale, and soon they would be down to the 1000 feet level. By continuing their operations they would open out a grand mine. A large expenditure had been made upon Corby's shaft, and he was confident they would derive great advantage from it, because they had the same strata there as they had in the Kapanga from the 420 level upwards, from which the greatest riches of the mine had hitherto been obtained. The machinery erected, and the capital in hand, would be sufficient for the opening up of that portion of the property, and the directors believed the present year would show such results as would be very satisfactory to all concerned. (Applause.)

Mr. LASKER asked for further particulars concerning points of detail in the accounts which were given him.

A SHAREHOLDER asked if the directors intended to distribute all or a portion of the Blagrove shares.

Mr. LANE said if the directors could dispose of a portion of those shares at a price which would give them £12,500 to replace their working capital, they might consider it advisable to distribute the remainder as they did in the case of the Hauraki.

The motion was then put and carried unanimously.

The CHAIRMAN next moved: "That the distribution by the directors amongst the shareholders by way of dividend, of 50,000 shares, fully-paid, in the Hauraki Mining Company (Limited) be and the same is hereby approved."

Mr. S. GOLDSMID seconded the motion, which was carried.

The retiring director, Mr. S. Goldsmid, was re-elected, as was also the auditor, Mr. J. C. Bolton.

Mr. C. HARTIDGE proposed a vote of thanks to Captain Argall for the energetic manner in which he had carried on the developments of the mine.

This was seconded by Mr. WITHEFORD, and carried.

A vote of thanks to the Chairman and directors, heartily given on the motion of Mr. BOLTON, terminated the proceedings.

## THISTLE REEF GOLD MINING COMPANY, LIMITED.

An extraordinary general meeting of shareholders in the Thistle Reef Gold Mining Company (Limited) was held on Monday, at the Cannon-street Hotel, Mr. B. HALLETT presiding.

The CHAIRMAN said: Gentlemen—We have placed in your hands the reports, balance-sheet, and other information regarding the proposed scheme, in order that you might have a fair time to consider them before the date of this meeting. I do not think I have much to add. That information is pretty full, and gives you a good description of the company's property. I may say, however, that Mr. Newbery, who has lately returned from Barberton, is here, and will answer any questions you may care to put to him. At great trouble and inconvenience to himself he went over to Barberton, and he has put the company's property into a very fair condition. A great deal of work has been done during the last 18 months; the property has been completely opened, and although the ore is not of very high grade, still there is a very large amount of it, and given a 50 stamp battery, which the capital under the proposed reconstruction will provide, we think eventually the property will have as good a chance of paying as many others in Africa. I shall be able later on to afford you some testimony in support of that. No doubt there has been some delay caused by the late manager's vagaries. I may tell you that we possess extraordinary advantages for economical working. We have a water power sufficient to work our stamps the whole year round; we have, secondly, a railway coming within a stone's-throw of our property; and thirdly, there is the natural configuration of the ground, which enables the ore from the stamps to come straight down without any handling right to the tailings dam. We have great encouragement as regards the future of the property in the fact of our next door neighbours being the Sheba Company. That is probably a unique property; still, it is doing very well indeed. The output for the last two months has been over 10,000 ounces per month. Now, that company is capitalised at £850,000, and it has only 200 and odd claims—not double the number that we shall have under the reconstruction. The Sheba Company is thus capitalised at over £4000 a claim. The Thistle Reef property comprises 24 acres, and we propose to acquire another 96 acres—partly on the north, between the river and the company's present property, and partly on the south and on the east extension. That will give us about 120 acres altogether, or more than half the holding of the Sheba, while we, under our new scheme, shall be capitalised at £200,000, against their £850,000, upon which the last dividend paid was 15 per cent. Having them as our next door neighbours, I think we have a very good chance of paying good dividends too. The distance of our property from the Sheba, I may say, is about half a mile as the crow flies; but it is a mountainous configuration, and it takes a long time to get from one property to the other. Of course, I do not wish to infer that our property has anything to do with the Sheba reef. I prefer the report and testimony given to us quite voluntarily by Mr. De Witt Hamer, published in the *African Review*. It is an interview with that gentleman, who is the well-known Mining Commissioner of Barberton, and who, with Mr. Von Gember, the Mine Inspector of Barberton, has lately been visiting the Thistle property. Mr. Hamer says:—"The Thistle property is well opened



up. It can be worked cheaply, and has a large body of ore, but it is of low grade. We know that, and we simply want enough machinery to treat the ore. The grade of the ore is not lower than that of a great many South African properties, and we think that with 50 stamps we can treat this ore very well. I have told you the property is well situated for economical working, and I think I may say that 5 dwts. will pay all the cost of working. If that is so, with 10 dwts. ore and 50 stamps at work we ought to pay a handsome dividend. If you will give these matters your careful consideration, you will see this company is but a genuine mining enterprise. There is a large amount of ore, and we have simply got to work it with sufficient power. I have not much to add, except to say that I hope the shareholders will not be under the impression that by assenting to the resolutions they will be committing themselves to the subscription of the new capital. We merely ask your concurrence and support to enable us to come before you on a future occasion and give you the option of subscribing for the capital in the new company. In the event of the resolutions being passed, however, we hope you will subscribe; but if you do not, there are two syndicates of responsible people who are prepared to take up the whole of the remaining shares. The Chairman concluded by moving a series of resolutions providing for the voluntary winding-up and reconstruction of the company under the title of the Thistle Consolidated Mines (Limited), and the appointment of Messrs. J. C. Bolton and A. H. Oxenford as liquidators.

The motion having been seconded, Mr. D. STEDYNG asked what would be the cost of the reconstruction. He thought more consideration ought to be shown for the present shareholders; they ought to be allowed to go into the reconstruction without putting their hands in their pockets. He also inquired whether the company's machinery was in working order, and expressed the opinion that before the new property was taken over the directors ought to get a thoroughly sound and independent report upon it. He had been at Barberton for some years, and knew the company's property. There were very good reefs in the vicinity, and he had confidence in the property, but he pointed out the absolute necessity of having a good mining engineer.

Mr. F. NEWBERRY said that with regard to Mr. W. J. Lee, he appointed him manager on the strong recommendation of Mr. Howard Hill, of the Sheba, and he had full confidence in him. There were millions of tons of ore in sight, and if they only got an average of 3 dwts. per ton their profit would be sufficient to pay handsome dividends when they had a big mill for crushing it, and with the cyanide plant for the treatment of the tailings.

A SHAREHOLDER: Have you every confidence in the property? Mr. NEWBERRY: I and my relations and friends invested £10,000 in this property, and bought at between 3s. and 4s. We have got our shares now, and are going heavily into the reconstruction. (Applause.)

The motion, on being put, was carried with two dissentients. A vote of thanks to the Chairman terminated the proceedings.

## TRANVAAL GOLD EXPLORATION AND LAND COMPANY, LIMITED.

An extraordinary general meeting of the proprietors of the Transvaal Gold Exploration and Land Company (Limited) was held at the Cannon-street Hotel, on Monday, Mr. NICOL BROWN (Chairman of the company) presiding.

The SECRETARY (Mr. C. E. Wells) read the notice convening the meeting.

The CHAIRMAN said: Gentlemen—Before proceeding to refer to the prospects of the company, as far as I could gather them from a visit to the company's mines, I want to explain respecting the distribution of the 295,000 shares of the Lydenberg Mining Estates (Limited) that it is proposed that a first distribution should be made of share for share, the shareholders having their certificates of this company endorsed to that effect. This will absorb 260,000 shares, leaving 35,000 to be dealt with. It is proposed that these shall be divided as follows:—One Lydenberg share for every eight Transvaal shares, which will come to 32,500 shares, leaving a balance to be realised of 2500 shares. If a shareholder holds 15 shares he will receive as a second distribution one Lydenberg and fractional certificates representing 7-8ths of a share. The fractional certificates will represent in each case 1-8th of a share. When I visited Johannesburg on my way to Pilgrim's Rest I saw some of the members of the Lydenberg Mining Estates board, but when I returned in January I found that three of them could not attend the meetings owing to the political storm which had passed over the place. These were Mr. Lionel Phillips, Mr. Abe Bailey, and Mr. Fitzpatrick. The place of Mr. Phillips was taken by his alternate Mr. Ronilott, and of Mr. Bailey by his alternate Mr. Correy, and the business went on without any difficulty. Under the new management, as you are aware, the board sits at Johannesburg. I had the pleasure of meeting them several times, and although the actual transfer of the property had not taken place, I discussed with them the future plans for the improvement of your property. I was present at a preliminary meeting of the new amalgamated board, which was held after the documents were all declared to be in order and ready for transfer. We have only got telegraphic advice within the last day or two that the transfer had taken place. At this meeting a report on the future plant and industrial prospects of the company, which I shall afterwards refer to, was approved of, and the necessary steps ordered to be taken to proceed with what it recommended. With regard to the staff, Mr. Werthman is the chief consulting engineer, Mr. Hoefler is the resident engineer, and Mr. Spiers, our late manager, has been appointed the business superintendent to co-operate with Mr. Hoefler in the management of the property. All these gentlemen have had great experience of mining work and business in their own spheres. The rest of our staff remains, with one or two exceptions, with the new company. Before I arrived with Mr. Werthman had visited the property, and during the time I was there he, in harmony with Mr. Hoefler, drew up a scheme for a new central mill, to be erected in the Blyde valley, which would draw the supplies of ore from Thets, Jubilee Hill, Beta, and the Clever Estate Mines. This mill is to have 60 stamps, and the reserve of ore now in sight at these points, in Mr. Werthman's opinion, is 160,000 tons. The 60 stamps will crush about 80,000 tons per annum at an inclusive cost of 30s. per ton, or (say) the value of between 7 dwts. to 8 dwts. of pure gold. As the ore from all the various sources averages about 23 dwts., and an extraction of 80 per cent. is expected, which equals 18 dwts. of free gold per ton, he leaves a profit of 10 dwts., or (say) about £2 sterling per ton; so that you can readily see the profits of the new mill will be very large. The new engineers go into the property with the hearty co-operation of all concerned in the old company, and I think you will agree with me that this augurs well for their future success. (Hear, hear.) In taking over our work from us, I heard none of those complaints which frequently take place when property is passed over from one set of engineers to another. I will now refer to some parts of the old plant, which I heard discussed by these new engineers. Farmer's race, which our board carried out at the suggestion of Mr. Farmer, and cost your board much anxiety for a long time, is now nearly finished; but it has yet to be lined with the iron sheeting sent out for that purpose. This race, as you remember, gave a horsepower of about 400, and has been accepted by the new management as a very good arrangement. So also with the new mill at Kameel's Creek. This is considered a very good piece of work, and will form a useful auxiliary. Every effort will be made in the meantime for earning money by it while the new 60 stamp mill is under construction. Then as to the old Brown's Hill mill. I understand it is the oldest mill in the Transvaal; it has been a faithful servant to us for many years. It has been renewed again and again, but the type of it is old, and as it has paid itself over and over again, we can afford to bear of its being broken up without annoyance. The ore hitherto treated by it will be entirely to the new central mill. I had no difficulty in falling

n with the proposal of a great central mill to draw supplies from our different mines, as the board had always thought this was probably the best way of dealing with our ores. None of us had ever seen the mine before, except Mr. Farmer, and our coming to a final decision on this point was naturally slow. The result of Mr. Farmer's visit is attested by the great race, as above-mentioned, which bears his name, and had it not been proceeded with at the time we started, it would have kept the new scheme much behind. As it is, the new management fear it may not be ready in time for the starting of their new mill, which they hope to have erected during the currency of this year. We now come to the question of the railway into the Blyde Valley, which it was hoped would be promoted when the scheme went through. The railway question in the Transvaal is one somewhat difficult to understand. The right of building railways is one of those concessions which the Transvaal Government gave in its earlier and poorer days, and which has now the effect of checking all such enterprises unless under the auspices of the Hollander Concession Company. The recent disturbances and friction will not aid us in this direction, but if the energy of our new engineers, which I have told you of, should in the near future yield the returns I have mentioned, we shall do very well to begin with. I have, however, impressed upon the board in Johannesburg the necessity of keeping the railway scheme constantly before them, and of informing us of the difficulties of the situation, in hopes that in course of time these difficulties will be removed. In the meantime it is not an urgent question, as the water power is sufficient, although none too much, for a year or so. But in years to come we cannot get on without the coal which we hope the railway will bring us. The mines round Pilgrim's Rest are well supplied at present with labour. The natives come from the low country on the other side of the berg, and as they mostly travel on foot, it is nearer by 200 miles for them to come to Pilgrim's Rest than to go to Johannesburg. Many natives during last year were away from the mines, called by their chief, Gungunhama, to fight the Portuguese; but the war in which they were involved is now stopped and the natives from that quarter will soon return to work. The difficulties in the Lydenberg district, equally as regards labour and some other conditions, are not so great as at Johannesburg. I was at Pilgrim's Rest during the troubles at Johannesburg. The wires between Pilgrim's and that city were in the control of the Government, and we got our daily news through the medium of Mr. Joubert, the Mining Commissioner. I must acknowledge the great courtesy received during this trying time from Mr. Joubert, who is a son of one of the great Boer families, who did all he could to maintain order in a very quiet and unassuming but, nevertheless, powerful way. At Pilgrim's I found no evidence of the irritating language that had been attributed to the Boers in other districts, and they seemed to me to be entirely conciliatory in their manner and speech. While Johannesburg was disorganised to the core, and all the mines around Pilgrim's, were quietly pursuing the even tenor of our way as had been done for years before, and, I trust, as may be done for years to come. (Applause.) There is one other matter that I have to refer to, and which I do with feelings of very great regret—namely, the death of General Bruce. He was with us for a great many years, and I may say that I never had a more loyal supporter than General Bruce. (Hear, hear.) I now beg to move the following resolutions:—1. "That the company be wound up voluntarily."—2. "That Charles Lee Nichols, F.C.A., of 1, Queen Victoria-street, London, E.C., be and he is hereby appointed liquidator for the purposes of such winding up."—3. "That the liquidator be and he is hereby authorised to distribute in specie among the members of the company all or any of the assets of the company as he may think fit."

Mr. W. FARMER said he had much pleasure in seconding the resolutions. Mr. COOPER thought it would be better if the board followed the usual course, and appointed their secretary as the liquidator, instead of one of the auditors.

The CHAIRMAN, in reply, said that Mr. Nichols, who was a professional accountant, had great experience in the winding-up of companies, and could obviously carry out the necessary proceedings to wind up the company more expeditiously than their secretary could hope to do.

Mr. BENJAMIN asked whether it would be possible, in view of the difficulties that had arisen, to facilitate the transfers.

The CHAIRMAN promised that the board would do all they could in the matter; but, of course, they could not alter the list that had been sent out to the Transvaal.

The resolutions were then unanimously carried.

A vote of thanks to the Chairman concluded the proceedings.

## LUPAARD'S VLEI ESTATE AND GOLD MINING COMPANY, LIMITED.

The eighth general meeting of the Luparaard's Vlei Estate and Gold Mining Company (Limited) was held at the Cannon-street Hotel, on Wednesday, Mr. HERBERT G. H. NORMAN presiding.

The SECRETARY (Mr. Henry D. Boyle) read the notice convening the meeting.

The CHAIRMAN said: Gentlemen—We meet here to-day to receive the report of the directors, and to pass the accounts up to June 30, 1895. I feel that I owe you an apology that the annual meeting is again held so late, but it is really not our fault, for it was quite unavoidable. Your interests are, however, in no way damaged by this, and I can add nothing to the reasons stated in the report. We had made arrangements to hold the meeting in December last. We had to defer it till we had Mr. Franklin White's full report; then Christmas came, and afterwards the disturbances in the Transvaal, which made it necessary to have a further postponement. In moving the adoption of the report and accounts, I am at last in a position to be able to congratulate the shareholders on their present condition and their future prospects. We have had to wait patiently for some years, I may say, and I take this opportunity of thanking you all for your kindness and forbearance, and I am now justified in saying that, if there be any certainty in gold mining, our success is now quite assured. Let me remind you that gold mining in our part of the Rand at any rate is no longer a speculation—it is a recognised industry. The lie of the strata is known almost to a certainty, and the cost of the machinery and of all outgoings can be calculated to almost a nicety. Our mine is no exception to this general rule, and we may look forward with the greatest confidence to the future. Having made these general remarks, I will now refer in detail to the various paragraphs of the report. The amount received from licenses during the year under review has been £6333 13s. 6d., showing an increase over last year of £649. Now, you all have before you Mr. Franklin White's report. It is the report of a very able, and at the same time a very cautious man. I conclude you have all read it, and I hope with the same feelings of pleasure and satisfaction that I felt myself. It showed beyond doubt that the mine has been proved, tested, and not found wanting, and it is fair to infer that the ore all through will give us 15 dwts. for each ton of mineral. It shows that we have 50,000 tons ready in reserve, and as it will take some eight or nine months to erect the machinery, further developments can be done during that period. Let me quote here from Mr. Boucher's report of 1892 as regards the question of machinery and the then state of the mine. He says:—"I strongly recommend that the mine be thoroughly tested; then, if it prove as valuable as it appears to be at present, that a first-rate plant be erected. By the time the mine is proved there will be railway accommodation direct from the coast to our ground, and it will then be possible to load up machinery at the coast, and off-load it within 200 yards of the proposed battery site. Fifty stamps"—which he estimates to cost, with every necessary, £58,330—"would crush 3750 tons a month, and if we only succeed in extracting 10 dwts. per ton, including gold from concentrates, we should make a profit of 14s. per ton, or £3625 per month, or £31,500 per annum. In conclusion, I

may add that if the mine be first tested, as I have recommended, and the mineral be found to yield by amalgamation and sale of concentrates an average amount of 10 dwts. per ton, the above outlay will be thoroughly justified, and amply repaid in profits. It has been proved over and over again on the Rand that first-rate machinery and large plants are far the most economical where there is an abundance of mineral, and that with a limited amount of working capital no good can be done." Well, the mine has been tested and proved, and will yield 15 dwts. to the ton. Our area is nearly 700 acres, and the amount of mineral is practically quite inexhaustible. The railway is now complete, so that Mr. Boucher's estimate may be excessive; but, at any rate, we know the worst. As regards the machinery, there are two courses open—we can either put up an ordinary crushing battery of not less than 50 stamps at the price I have named, or adopt the new dry crushing or direct cyanide process. We are making experiments on this process, and, if they prove successful, it will result in a very large saving of capital outlay. We are informed that the process has been tried with success on other parts of the Botha's reef—which is our reef. As regards the raising of the necessary capital, I purpose to defer my remarks until we come to the business of the extraordinary general meeting. The tree planting is going on satisfactorily, and even if we have no timber to sell, we shall, at any rate, have enough for our own use. Mr. White has resigned his position as manager, but acts as our consulting engineer. We have appointed Mr. Farnar as our new manager. He is a man of great experience, and is fully acquainted with the mine. Mr. Quentin has resigned his seat on the board; we have not filled up the vacancy, as we think that should be done by the shareholders in the proposed reconstructed company. Mr. Scott retires, and offers himself for re-election. The auditors are eligible for re-election. As regards the accounts, they are perfectly plain sailing, but you will see that there is a sum to the credit of profit and loss of over £15,000. We thought at one time that it might be possible to divide this by way of dividend amongst the existing shareholders, but the auditors took a perfectly different view. They held a very strong opinion to the contrary. The money, however, is in the mine; it is practically so much more working capital, and the company is to that extent in a stronger position. There are two other headings to which I would call your attention—upon the debit side, expenditure in South Africa; and on the credit side, sundry debtors. I have in my hand a schedule giving full particulars of the various items, in case any one should ask for the details. That, I think, is all I have to say, and the motion I have to submit is—"That the report of the directors be accepted." If anybody has any question to ask, I shall be pleased to answer it to the best of my power.

Mr. D. A. C. SCOTT seconded the resolution.

Mr. LEE SMITH suggested that the Chairman should give some particulars as to the reason for the reconstruction.

The CHAIRMAN: On that point, gentlemen, I am in the hands of the meeting. As a matter of convenience I thought it would be much better if I were to defer my remarks until the extraordinary meeting, but you are perfectly in order in asking that, and I am only too glad to give you a full explanation. Well, you have heard the exact position of affairs as regards the mine, and you will see that it is absolutely necessary that we should have a large working capital. (Hear, hear.) We, as a board, have very carefully considered the situation, and we have come to the conclusion that the best available scheme is a scheme of reconstruction. It is perfectly clear—at least I think so—that we could have borrowed the money, but under existing circumstances we should have to pay a very large rate of interest and to give a mortgage on our property, with all the concomitant disadvantages, and it is clearly much better to get the necessary amount from the shareholders themselves. (Hear, hear.) The capital of the existing company is £350,000, in shares of £1 each, fully paid. We propose to sell to a new company, to be formed with a capital of £250,000, the present undertaking of the existing company, the consideration being an issue of two £1 shares in the new company for every five shares in the existing company. This will absorb £140,000, leaving a balance of £110,000 as working capital; £70,000 of this will be offered to the existing shareholders at par, leaving £40,000 in reserve. Now, let us see how this works out. Take the case of a shareholder owning five shares in the existing company. These are worth about par in the market. The shares in the new company would be worth £2 each, and so far he would be a loser by £1. But he is entitled to a £1 share in the new issue, which would also be worth £2, so he will be a gainer, and it is clearly for his advantage to come in. If, however, he does not choose to do so, he is entitled to be bought out by arbitration. As regards dividends, you will see that under any circumstances his position is unchanged. He will get just the same amount of dividend. It is immaterial whether he gets a larger dividend on two shares or a smaller dividend on five shares, for he will get exactly the same money. You have, of course, seen by the report that in consideration of being allowed to subscribe at par for any shares not taken up by the shareholders, the Consolidated Gold Fields have guaranteed the whole £70,000 issue at par, so that the success of the scheme, even if the shareholders refused to come in, is absolutely certain. I am not very enamoured of schemes of reconstruction, but I think it is very difficult to find a better one than this. I have now answered the question put, and have anticipated the remarks which I should have made at the extraordinary general meeting. (Applause.)

Mr. DE PASS thought that many of the shareholders would not understand the necessity of cutting down their capital 50 or 60 per cent., and personally he did not see that it was necessary. They were not dealing with a credit or financial institution, but with a mining estate, and as the Chairman had said, they had not lost any of their capital. While he was quite ready to accept the Chairman's assurance, and the assurance of the Chairman of the Consolidated Gold Fields, as to the value of the Luparaard's Vlei property, still he felt rather sore at having his capital cut down. No doubt the Chairman's argument that the shareholders would hold precisely the same interest in the new company as they had in the old was correct, but at the same time the cutting down of the capital gave rise to a plausible contention that the company must be over-capitalised.

Mr. LEE SMITH said he also failed to see, if the company was in the satisfactory position described by the Chairman, why he should be asked to take two shares in the new company for his £5 holding in the old. He could not, in fact, see any necessity for reconstruction at all. With a prosperous undertaking such as theirs was, there should be no difficulty in borrowing the money they required on debentures, or from the Consolidated Gold Fields Company itself. He also objected to the proposed guarantee by the Consolidated Gold Fields. Why should not the shareholders themselves have the opportunity of taking up the shares that were left after the pro rata distribution?

The CHAIRMAN, in reply, said he thought it had been made perfectly clear that in the reconstruction the shareholders would have exactly the same interest as before; the dividend would not be touched, because, whether it was a large dividend on two shares, or a smaller dividend on five shares, the result would be exactly the same. That, he thought, was absolutely patent to everybody. It was said that they could borrow money from the Consolidated Gold Fields. They could do so, no doubt, but they would have to pay 8 per cent. for it, and was there anyone who would recommend that course—to borrow at 8 per cent., with all the concomitant disadvantages of having a mortgage on their property? He said most emphatically that the scheme that was proposed was the best that had been suggested. Further capital they must have, and this was the best way in which they could raise it. The expense of the scheme would be very little. At any rate, he had not seen a better way of effecting their object; if anyone could suggest a better scheme, he should be glad to consider it.

The resolution was then carried unanimously.

Mr. D. A. C. Scott was re-elected director, and Messrs. Tarquand, Young, Bishop, and Clarke were reappointed auditors.

An extraordinary general meeting was next held for the purpose



of considering the resolutions for the reconstruction of the company.

The CHAIRMAN, in moving the resolutions, said that he had nothing to add to what he had already said on the subject. More capital they must have, and he was unable to conceive any scheme better adapted to their purpose than the one he had to propose.

Mr. LEIGH HOSKINS seconded the resolutions, and said he thought that the objections that had been raised to the scheme were more or less sentimental. (No.) He meant that if it were established to the satisfaction of the meeting that under the new scheme the dividends, when paid, would be exactly the same as in the old company, he could not but think that the objections to the scheme were sentimental. A shareholder who now held five shares would be in exactly the same position as if two shares in the new company. He could only surmise that the idea in some of their minds was that the Consolidated Gold Fields, having guaranteed the capital at par, looked upon the shares as not worth more than par. Speaking as a director of the Consolidated Gold Fields, he could say that there was not the least foundation for such an idea. The only object of that company was to guarantee that the capital should be raised. Nothing had been said to show that the scheme was a bad one, and the only suggestion made was that the money might be borrowed at a ruinous interest.

Mr. LEE SMITH said that so far as that went he thought the directors were quite right, but he did not see why they should have the guarantee from the Consolidated Gold Fields. If the shares were so valuable, the shareholders would not doubt take them all up.

The CHAIRMAN said that that was very likely, but did not amount to a guarantee.

In the course of some further discussion, Mr. HOSKINS said the Consolidated Gold Fields did not expect to get anything out of the guarantee, and though he was not in a position to absolutely pledge that company, he had little doubt that they would be willing to withdraw from the guarantee if it were found that the shareholders were prepared to take up the whole of the capital.

Several shareholders expressed themselves as satisfied with this assurance.

The CHAIRMAN, in putting the resolutions to the meeting, said that they would have to have a confirmatory meeting, and by that time they could ascertain the views of the Consolidated Gold Fields on that point.

The resolutions were then carried unanimously, and a vote of thanks to the Chairman concluded the meeting.

## BURNHAM SYNDICATE, LIMITED.

The first general (statutory) meeting of the members of the Burnham Syndicate (Limited) was held on Monday, at the Cannon-street Hotel, under the presidency of the Marquis of TREVEDALE.

The SECRETARY (Sir C. R. Lighton) read the notice convening the meeting.

The CHAIRMAN said: Ladies and Gentlemen—This meeting is convened in order to comply with the statute, which requires that a meeting of shareholders shall be held within four months of the formation of the company. There are, of course, no accounts to present to you, but I propose to take advantage of the opportunity to describe the objects and aims of the syndicate. The main business of the syndicate will be to deal with what we believe to be a most valuable discovery in connection with the treatment of what are known as sulphide or refractory ores. It is well known to all metallurgists and smelters that mixed sulphide ores of silver lead and zinc could not hitherto be treated successfully by any of the ordinary processes, and for many years past metallurgists, stimulated, no doubt, by the prospect of large profits, have been endeavouring to discover a method for utilising the enormous quantities of these ores, which appear to exist in almost all parts of the world. This is not a vague and general statement, because we have ample information on the subject, derived from the reports of companies owning mines in which these ores exist; and from these reports we gather that there is practically an inexhaustible supply of sulphide ore, notably in Australia, the United States, and Mexico, as well as in other parts of the world. Finding that the ordinary fire processes would not treat these ores, metallurgists have sought to separate the several metals contained in the ores by employing various acids and chemicals, and by calling in the aid of electricity, and during the last year or two several wet processes have been elaborated with more or less success, but they are all open to the objection of being very expensive; indeed, one of the latest, and I believe one of the most promising, admits to an initial operating expenditure of something like £3 or £4 a ton. Further, these processes are all very complicated, requiring skilled labour, and also a large and very costly plant. In certain districts where the mixed sulphide ores occur in immense quantities, the absence of water, or the scarcity of water, renders all these wet processes utterly impracticable. Now, the process which the Burnham Syndicate has been fortunate enough to acquire is exceedingly simple and inexpensive; it requires a comparatively small outlay for plant, and can be adapted to the conditions existing at the various mines. Without attempting any technical description of the process, I may give you the following particulars, which will be readily understood by all present. The ore is ground sufficiently to pass through a sieve containing nine holes to the linear inch; then it undergoes a rough calcination sufficient to drive off the greater part of the sulphur contained in the ore; then it is agglomerated into lumps in a reverberatory furnace, and from thence smelted in ordinary cupolas by means of a special flux, which is the subject of the patent acquired by the Burnham Syndicate. This flux is composed of two very simple materials—namely, sulphate of soda and oxide of iron, which are very cheap and easily obtained. The flux is prepared by agglomerating the two materials of which it is composed, and is then put into an ordinary cupola smelting furnace along with the ore and the fuel, no other materials being required. The lead, silver, and gold contained in the ore run out together from the furnace in the form of a very clean silver-gold metallic lead, and this finds a very ready market. The zinc contained in the ore passes out from the furnace with the slag, and is recovered in the ordinary way. Although the ore contains but a low percentage of lead, from 80 per cent. to 85 per cent. of the total lead is recovered. The whole of the silver and gold, as shown by the ordinary fire assays, is recovered, and the greater part of the zinc contained in the ore is also recovered. The expenses of smelting, even including the flux, exceed but very little the charges for smelting ordinary silver-lead ore, and the reason of this is that the slags are practically free from lead and silver, and do not need to be re-treated, as is almost invariably the case with ordinary argentiferous lead ores. We are, therefore, able to claim for our process—first, a comparatively small outlay for plant; secondly, low working charges; thirdly, no need of water, excepting for the boilers which supply steam for the engines; and fourthly, very little loss in lead, and practically none in the precious metals. There have been treated at the Swansea works by this process about 1500 tons of ore in all. The average working cost for the recovery of the lead, silver, and gold, in the form of silver-gold bar lead, is only 25s. per ton, and that in plant not specially erected for the treatment of this ore. We have every reason to believe that when the new plant now in course of erection is completed, our working costs will be reduced by at least 5s. per ton. The plant we are now erecting, which will be finished in about a month, will enable us to treat about 25,000 tons of ore per annum, on which we fully expect to make a profit of 30s. a ton, exclusive of the zinc; but when our plant for the recovery of zinc also is erected, we expect to realise more than 30s. per ton—that is, at an operating cost of 25s. at the very outside. We have already bought considerable quantities of ore under contract. It is our intention, however, to form a company with a sufficient working capital to enable us to erect works for the treatment of 75,000 or, perhaps, 100,000 tons of ore per annum in this country, and we have no doubt we shall have no difficulty whatever in securing this quantity of suitable ore under contract for

a term of years. Another part of our plan is to form a company for the treatment of sulphide ores in Australia at the mines. Many of these ores are too poor in metallic contents to bear the cost of transport to this country, and must, therefore, be treated on the spot. We have made a provisional contract by which we secure the output of one of the largest mines in the Broken Hill country, and also have secured their smelting works, which are capable of treating something like 2000 tons of ore per week. Most of the plant needed for our process is already erected and in good order there. We shall have, however, to put up some additional plant, but this should not occupy many months. I may also add that overtures have been made to us from the United States, where the great value of such a process will be fully appreciated by all acquainted with the extent of sulphide ore mines in that country. I have now given you an account of our patent, and what we propose to do with it in order to turn it to profitable account. But I have not told you the steps that have been taken to satisfy ourselves on two points of great importance in dealing with any patent—first, as to the novelty of the patent; and, secondly, as to the figures of cost and probable profit attending its use. With respect to the first point, I consulted one of the first scientists of the day—I mean Professor Dewar—who, I was glad to find, though I was not aware of it at the time, had made a special study of the treatment of sulphide ores. The professor assured me, after a very careful inquiry and investigation, that the patent process in question was absolutely novel, and indeed he went the length of saying that he considered the discovery, so far as the mode of treating refractory ores was concerned, one of the most remarkable that has been made in recent times. This opinion is fully confirmed by Messrs. Cartmell, our patent agents, who are well known to have a very extensive knowledge of patents, and whose opinion is, therefore, of very considerable value. With regard to the second point, I have to state that the actual smelting operations have been watched most carefully by skilled persons for the express purpose, and the results reported to those interested in the acquisition of the patent. No portion of the process has been omitted, and nothing has been slurred over. The cost of the ores, of the materials employed in their treatment, and of the labour, and the prices obtained for the silver, lead, and other metals extracted, have been ascertained with care and precision. These reports bear out the statements I have made, which amount to this—that we are at present treating sulphide ore at Swansea at an operating cost of 25s. a ton, and at a profit of as much more, which profit, we believe, will very shortly be increased when the apparatus more carefully designed for the purpose has been erected. Three of the directors here, who have nothing whatever to do with the patent, but who are interested in its acquisition, have been to Swansea and witnessed the operations, and were equally surprised and delighted with what they saw. I think I have said enough to convince you that the patent which has been secured by this syndicate is one of great commercial value, and that all that is wanting to turn it to good and profitable account is ordinary care and good management. (Applause.) If there are any questions which I can answer I shall be glad to reply to them; any questions of a technical character will be answered by the patentee.

In reply to Mr. THOMSON, Mr. H. E. FRY said that 20 tons of the Broken Hill Proprietary sulphide ores were treated at Swansea, with the result that they recovered the whole of the metallic lead contents within 15 per cent.; they recovered the whole of the fire assay silver and they also recovered the gold that was contained in the ore. They did not attempt to recover the zinc, because their plant for that was not erected, and because also they claimed no novelty in recovering the zinc, as they would simply treat the zinc residues in ordinary zinc furnaces, or spelter pots, as they were called.

On the motion of Mr. HARRIS, seconded by Mr. EWART, a hearty vote of thanks was given to the Chairman, and the proceedings terminated.

## WEST KALGURLI GOLD MINES, LIMITED.

The first ordinary general (statutory) meeting of the West Kalgurli Gold Mines (Limited) was held on Thursday, at Winchester House, under the presidency of Colonel HUGHES HALLERT, the Chairman of the company.

The SECRETARY (Mr. H. Edwards) read the notice convening the meeting.

The CHAIRMAN said: Gentlemen—This, as you are aware, is the first or statutory meeting, which is bound to be held within four months of the registration of a public company. It is, strictly speaking, therefore, only a formal affair; but I might perhaps take the opportunity of giving you some information in reference to your property. As you know, we issued no prospectus inviting public subscriptions for the shares, as the working capital required was all privately guaranteed. I will do my best to put details before you as lucidly as I can. Speeches on mining matters generally are uninteresting to the majority of folk, as they can only deal with hard facts. I hope you will consider the facts which I shall give you as sufficiently interesting for you to stay and hear them. Perhaps I cannot do better than commence by stating that the property has been duly transferred to the company, and that it is being developed as rapidly as possible by the manager whom we have appointed at the mine. We directors have reports from three mining experts on which, we think, we may rely. Those statements are simply set forth, without any attempt at ornate language, and as such may be regarded, in my humble judgment, as all the more genuine, honest, and true. Your property is situated about 2 miles north of the town of Coolgardie, Western Australia, and consists of two blocks, or mining leases, numbered 438 and 518 respectively, each comprising an area of about 12 acres. A powerful reef, according to the reports received, of highly auriferous ferruginous quartz runs centrally through these blocks, being traced through their entire length, by a strong outcrop at various points, and becomes a continuation of the reef which is now worked by mines lying to the east and west of your property. The reef, which is a true fissure lode, consists of quartz, intermixed with ironstone and brown hematite or pyrites. You are aware that the presence of pyrites is a tolerably sure indication of the presence of gold. The width of the lode varies from 8 to 10 feet, fine particles of gold being abundantly and very evenly distributed throughout the quartz; and from a large number of tests made and from samples taken from various openings it is estimated that the entire mass of quartz from wall to wall will give from 2½ ounces to 3 ounces of gold to the ton. (Applause.) This test, you understand, was made from average quartz only. The general direction of the reef is east and west, the underlie being to the south-west at an angle of 30° from the perpendicular. On lease No. 438 a shaft has been sunk on the underlie of the reef to a depth of about 120 feet, showing the lode at that depth to be 8 feet wide, confined in walls well defined, and being without doubt a true fissure lode. Quartz from the bottom of the shaft on crushing assayed 3 ounces 6 dwts. of gold to the ton. (Applause.) About 100 feet west of the shaft to which I have alluded another shaft has been sunk on the underlie to a depth of 30 feet, exposing the same lode well defined. On lease No. 518 a shaft has been sunk on the underlie of the reef to a depth of about 60 feet, showing the lode at that depth to be 7 feet 6 inches wide. Quartz taken from the bottom of this shaft assayed 2½ ounces of gold to the ton. Another shaft has been sunk on the west side of the shaft last indicated to a depth of 40 feet intersecting the lode. Various costean, or pot holes, have been sunk through some very rich leaders which, when properly prospected

are considered, judging from surface indication, to be of a very promising character. Timber, which forms so important a factor in all mining operations, can be obtained in the neighbourhood for fuel and mining purposes, the district being abundantly wooded. The great difficulty that has to be met with, as a rule, and overcome in the gold fields of West Australia, is the scarcity of water for milling purposes, but you will be glad to hear that this difficulty is being substantially met. Water is obtainable at sinkings of from 20 feet to 150 feet, varying in saltiness from very salt to practically fresh water. A system of catch-takes is being instituted by the Government, which will be the real water preservation of the future. With regard to your own particular property, I am glad to be able to tell you that one of the engineers who reports on it states that on our lease No. 518 water has already been obtained for milling purposes, and that he calculates that on sinking to a depth of 150 feet sufficient will be provided to keep a battery of stamps going. The transit of machinery has been in the past a matter also of some difficulty, but it has been gradually overcome by the continual extension of railways. I might mention that the block adjoining our property, according to a reliable report, has furnished some valuable quartz. The reef, across which several trenches have been cut, and which outcrops at intervals along the line, shows a variation of from 12 to 14 feet in width from one end of the property to the other. Very fair gold was met with here. The manager at the mine broke a little into the reef, which, at one exhibited, he reports, some very rich looking quartz, well mineralised, so much so that he then sank a further depth of 20 to 30 feet before finally breaking well into the reef. Experts who have independently examined the property have given it as their opinion that the reef will carry heavy gold from the way the quartz is mineralised, and from the character of the mineral itself. It outcrops for a distance of three miles or more, east, west, and south of your property, and all along the line of reef. Our manager, in his recent reports, states that he is continuing sinking the shafts on both leases, and that the outlook of the ground is very promising. He reports also a very rich find situated about 350 yards south of lease No. 518, which, if it lives, will run straight into the line of reef, about 120 yards east of the new shaft. He goes on to say that this formation is estimated to furnish an assay of 50 ounces of gold to the ton. I am not going to give you that statement as my own, you understand, or as the result of actual testing, because nothing would induce me to hold out hopes to shareholders of extravagant assays as being normal assays, unless I knew them to have been indubitably proved as such, but I think you may feel quite satisfied with the assay I first gave you, that of 3 ounces 6 dwts. of gold to the ton. I hope from what I have said of the present development of the property that you will not consider that your directors, during the short time they have been at the head of affairs, have been or are idle. It may, I think, interest you to learn that, according to the return published on the 11th inst., the output of gold in West Australia during the month of February last amounted to 17,922 ounces, valued at £68,104, as against 16,350 ounces, valued at £62,130, for the month of January. Of this amount the Coolgardie district yielded no less than 11,460 ounces of gold, valued at £43,548. In 1894 the total output of gold in the Coolgardie district was something over 100,000 ounces, valued at over £400,000. In 1895 the total output was over 125,000 ounces, valued at more than £475,000 odd. If any shareholder desires information with regard to the district in which our property is situated, he cannot do better than refer to the journal called the *Australian Trading World*, a valuable paper on West Australia, which will give him every information required. I do not know that for this preliminary or statutory meeting I have anything more to tell you, except that the directors have availed themselves of the services of Mr. Percy Fowler, M.I.C.E., who is proceeding to West Australia to report upon and advise as to the present position and future development of the property. His report, as soon as received, will be laid before you, and the reports which from time to time we may receive from the manager at the mines will be duly communicated to you. At our next meeting I fancy I shall be able to give you some additional solid information. Meanwhile, I thank you for the courtesy, patience, and attention with which you have listened to my statements and observations to-day, and I shall be happy to answer, to the best of my power, any question that any shareholder may like to ask. (Applause.)

Mr. HOSKINGS moved a vote of thanks to the Chairman and directors, and remarked that the property which the company possessed was no doubt a valuable one. He expressed the hope that at the next meeting the shareholders would hear something to their advantage with the prospect of a substantial dividend. (Applause.)

Mr. BOTT seconded the motion, which was carried unanimously.

The CHAIRMAN briefly acknowledged the compliment, and the proceedings terminated.

## HEIDELBURG PROPRIETARY MINING COMPANY (LIMITED).

An extraordinary general meeting of the shareholders in the Heidelberg Proprietary Mining Company (Limited) took place on Monday, at the company's offices, No. 5, Throgmorton Avenue, E.C., when Mr. S. Bauman, who has recently returned from Johannesburg, presented his report of the position, &c., of the property acquired.—Mr. F. C. Bradberry, the Chairman, in introducing Mr. Bauman, whom he described as one of the pioneers of the gold industry in South Africa, said, having more cash in hand than was required, the board had invested a portion in 10 £100 Transvaal Four per Cent. bonds, and taking the price of to-day they could make a profit on them of £400. They had now given instructions to Mr. Griffiths, their engineer, to give out contracts for putting down boring holes on their property, and in a very short time he hoped to be able to give the shareholders some good news as to its value. When the property was proved they would create a number of subsidiary companies, through the medium of which the directors look for considerable profit to be realised.—Mr. S. Bauman then gave a very interesting description of the property, which, he stated, was 10,000 acres in extent. The success of the mining work carried out on adjoining properties on reefs carrying good amounts of gold, which no doubt ran into the Heidelberg lease, was a good omen for their future prosperity, and in addition to this they might look forward to increasing their income by developing the country where coal had been discovered.

THE DIRECTORY OF DIRECTORS.—This useful and well-known publication, for which the company world has to thank Mr. Thomas Skinner, has made its appearance with its accustomed regularity, the care and patience exercised in its compilation being the same on this as on preceding occasions. As the author remarks in his preface, the past 18 months has been a period of exceptional activity in the mining branch, and this fact is responsible for the ample dimension of the 1896 volume, which is above the average size. Nothing need be said respecting the merits of this work, since it is so well known to all whom it is likely to appeal as a useful work of reference, and with the statement that the present issue is even characterised by greater than ordinary excellence, the book may be returned to the shelf.



## CORRESPONDENCE.

\* We wish it to be understood that we do not hold ourselves responsible for, and do not necessarily endorse, the opinions of correspondents. All communications must be accompanied by the names and addresses of the senders, though these need not necessarily be published.

## THE BESSEMER PROCESS.

TO THE EDITOR OF "THE MINING JOURNAL."

SIR,—A Presidential address has recently been delivered at Pittsburgh to the American Institute of Mining Engineers by Mr. J. D. Weeks, who has taken advantage of that prominent position to repudiate my just claims to the steel invention that bears my name, and which has been most amply acknowledged by America's most honoured scientific institutions, manufacturers, and citizens during the last 40 years. I may not inaptly preface the remarks I have to make on this subject by the words of our immortal Bard:—

"Who steals my purse, steals trash;  
'Twas mine, 'tis his, and has been slaves to thousands;  
But he who filches from me my good name  
Robs me of that which nothing can enrich him,  
And makes me poor indeed."

A great moral responsibility is incurred by the man who, for the mere purpose of gaining a short-lived popularity, does not hesitate to blast the reputation of one who he well knows in his own heart is the real inventor of that process which has so enormously extended the trade and commerce of his own country, and for this unworthy object flatters his hearers by telling them that they owe all this to a countryman of their own; taking the opportunity of making these statements at a public meeting at which I necessarily could not be present, and relying for this monstrous accusation upon such vague testimony as he has been able to rake up from bygone transactions touching only one side of the question. Mr. Weeks well knew that a period of 40 years, and the wide Atlantic, separates me from all documentary evidence on my side of the case, and which, at the period when all the facts on both sides were before the American people, they had, to their great honour, decided in my favour, and to which opinion they have adhered up to the present day. Fortunately, however, for me, some of the evidence which Mr. Weeks brings forward to support the case of Mr. Kelly, from the very nature of things, furnishes conclusive evidence against the allegations which he makes in favour of Kelly's scheme, and in order that the whole subject may be clearly understood, it is necessary for me to refer to some technical details of iron-making, showing their close analogy with the process said to have been carried out by Kelly.

For the last hundred years or more, it has been the practice of manufacturers of malleable iron to operate upon the crude pig iron in a small shallow bath, known as a refinery, or "finery fire," in which the molten pig iron is subjected to a blast of air blown down upon its upper surface from three nozzles arranged along the side of the bath, or pool, of iron, the surface of which has a quantity of incandescent coke floating upon it. After this blowing operation has been continued for an hour or two, the molten matter is to some extent decarburised and partially deprived of its silicon; it is then run out and formed into thick plates, which, when cold, are very hard and brittle white iron; these plates are broken up and reheated in a reverberatory furnace, and rendered malleable by the laborious process of puddling. We hear that a Mr. Kelly was making some experiments of this kind as far back as the year 1847, and we are told by the President, Mr. Weeks, that "Kelly was a forgemaster making malleable or wrought iron, and it was to make this product that he pursued his experiments," so that, according to the evidence furnished by Mr. Weeks himself, Kelly did not contemplate the production, or even try to produce steel by his experiments, as that material was quite out of his line of business.

But it is cast steel, such as Bessemer invented (and perfected the process of making in every mechanical detail), that has played such an important part in the metallurgy of the present century; it was this cast steel, and not the wrought iron, which Kelly was trying to improve, that has laid the 170,000 miles of steel rails like a network over the whole Continent of America; it was this cast steel made by the Bessemer process, and the machinery invented by him, with which the 4,180,072 tons of cast steel was made in America in the year 1872, and not by any plan or device originated or practised by Mr. Kelly.

Now, what could be more natural for a forgemaster and manufacturer of wrought-iron than to try and save some of the fuel used in the ordinary process of his trade; and what would appear more obvious than the idea that some, or, perhaps, all, of this incandescent coke lying on the molten pig iron in the "finery furnace" might be saved; this doubtless was the sole and simple object which Kelly had in view when he was trying experiments in his open yard, as described by Mr. Weeks, operating in a very temporary way, and using the end of an old boiler lined up with bricks and containing about 500 lbs. of molten iron from the blast furnace—just such a charge as when refined would be enough to make a charge for the puddling process which had to follow, and thus to make it into malleable or wrought iron, which Mr. Weeks tells us was Kelly's trade, "and what he was trying to make." This was just such an experiment as might be safely made without previously taking the precaution of patenting it, as its value, if successful, would be very small. The apparatus, he tells us, was provided with a single nozzle blowing vertically down upon the metal, and which single jet of air blown down upon it would partially, though very imperfectly, refine it, as is done in the "finery fire" in common use; and when this scheme, which had long been utterly abandoned and forgotten, was investigated some eight or nine years after these experiments had been made, all the evidence which I could collect went to show beyond all reasonable doubt that Kelly was simply trying to make his "finery iron or plate metal" without the employment of any coke floating on the surface, and thus saving some fuel in preparing his metal for subsequent conversion into malleable iron.

This was the impression which was irresistibly forced on my mind at the time these questions were before the American Patent Office, and I have at this moment the most absolutely conscientious belief that Kelly was not at that period even attempting to produce fluid malleable iron or steel in a fluid state such as could be formed into ingots or castings.

And when we read the strongly-biased statements of Mr. Weeks, and note his all-important omissions, his own story furnishes me with an absolute denial of his most unwarrantable assertion that Kelly had originated the Bessemer process.

Now, one would have thought that if Mr. Kelly commenced his experiments in 1847, we should have heard something of this revolutionary process before the year 1856, but we are told that "as late as 1856, after nine years of work, the appliances he used were exceedingly crude." Mr. John E. Fry, who was a foundry moulder at Cambria when the first experiments were made at Johnston by Kelly, "in a conversation a few days since," thus described the first converter made in 1856 to Mr. Weeks:—

"This apparatus was a 2 feet section of a 3 feet boiler shell, lined up to about 16 inches in diameter, having a paved fire-brick bottom about 20 inches deep; this was put outside the door of the blast engine-room of the old Cambria blast furnace. The engines gave from 3 lbs. to 4 lbs. blast pressure; there was a temporary connection made from the blast pipe to this little auxiliary furnace by a gas pipe. The nozzle was a cast-iron affair, such as was used at the tuyeres in those days. The tuyere was 'clayed up,' and dried and connected by a loose elbow to the pipe so as to be swung down into the metal. The metal was melted at the foundry, and brought up in a ladle containing about 500 lbs. The furnace was about 200 yards from the foundry, and the ladle was put on to a little metal hauling car, and hauled to the converter; this metal would make probably 8 inches or 9 inches of depth in this little pot. As soon as the metal was dumped in the pipe was shoved down with the blast on, a cover of pieces of sheet iron was laid across the top to prevent the sparks flying too freely." And here the evidence drops short, and it is clearly not worth their while to pursue the subject any further, it would be dangerous to do so; it would, in fact, "let the cat out of the bag." These discreet witnesses have given all the very interesting details as to the "dumping" in of the molten iron, even to the kind of "little hauling car" which conveyed the metal to the apparatus; but it would have been infinitely more to the purpose if these observant witnesses had told us something about the way in which this metal was taken out again, in what state of partial or complete solidity it did result in, or whether it was soft malleable iron or hard and brittle "plate metal." They have told us nothing of the use of ingot moulds, in which the molten malleable iron must be made into ingot, they have told us nothing of the treatment of the metal after it was blown. Was it taken to the puddling furnace to be there converted into wrought iron, or was it rolled into bars or sheets from ingots formed while in a fluid state? Without all these essential facts all their testimony and affidavits are worse than waste paper, as they directly prove nothing; but the absence of these facts afford very strong circumstantial evidence that Kelly never had produced homogeneous malleable iron, and had never made an ingot by his process.

Kelly's method of operating by one tuyere only, blowing vertically downward, shows that he had never grasped the fundamental principles on which the Bessemer process is based; his nine years of failure shows that in all that time he had not mastered the A B C of the Bessemer process. Now there is such a thing as blowing and blowing, and as we are told in the old fable, by simply blowing, a man may either "warm his fingers or cool his broth."

But Mr. Kelly saw none of these nice distinctions, and to compensate for this want of knowledge, Mr. Weeks, with much perverted ingenuity, has striven to whittle down the Bessemer process until it is low enough to reach Mr. Kelly's level, and strives to impress on his hearers the idea that the Bessemer process is summed up in the words "blowing air into iron," and Kelly having done this, is, therefore, according to Mr. Weeks' theory, on Bessemer's level. This, however, is not so; the mere blowing of air into a fluid is not a patentable suggestion, it is not a "new manufacture," and before we can obtain a valid patent we must produce something tangible, something not before produced by the same means, something which is, in fact, either of better quality or less in cost than has been produced by former methods. "I, therefore, claim as my invention the forcing of currents of air into and among the particles of molten crude iron, or of remelted pig or refined iron, until the metal so treated is rendered malleable, and has acquired other properties common to cast steel, and still retaining the fluid state of such metal, and pouring or running the same into suitable moulds," and so obtaining a "new manufacture."

Now blowing air into a fluid mass is not a manufacture at all, and, therefore, is not patentable; thus, for instance, you may blow heated air into linseed oil, but that is not a new manufacture, such blowing might be simply to warm the oil; but if you blow air in a heated state in numerous divided streams upward from a perforated coil, lying at the bottom of a tall cylindrical vessel filled with linseed oil, the oil so treated will combine with the oxygen of the air and become viscous and tenacious, and will acquire the same drying quality as oil that has been boiled with oxide of lead in the usual way of making drying oils, and hence such a process of blowing air into oil by its chemical action produced a superior drying oil and was a new and patentable manufacture; this was an invention of mine 10 years before I thought of steelmaking, and for which invention I reaped my reward.

Again, if you blow cold air in numerous jets upward through a vessel filled with cream, that is in itself not a new manufacture, but if your streams of air are powerful enough, and sufficiently long-continued, the violent agitation caused thereby will convert the cream into butter, and result in the production of butter without churning, and thus becomes a new manufacture capable of being secured by patent. The different effects produced by different modes of blowing are well exemplified in the old Catalan furnace used in iron-making, where the tuyere is made carbonising or oxidising by merely altering the angle at which the tuyere is directed through the fuel, and by means of which adjustment of angle the workman regulates his process. Again, in the old "finery fire" the tuyeres blow down on to the metal at such an angle as will throw the metal to the opposite side of the bath, and insure a rapid circulation of all the metal under operation, without which this old process of "blowing iron" would entirely fail. All this is mere matter of history, but, being known, it serves to show the entire want of ingenuity and mechanical skill, and the complete absence in the mind of Kelly of the most simple and rudimentary knowledge on the subject of the motion of fluids impelled by currents of air, as is clearly shown by his choice of the vertical position of the tuyere, in blowing on to, or into fluid iron. Kelly appears to have adhered from first to last to this fatal mistake of using one tuyere only, and that one operating in the very worst position in which it was possible to place it; a position most certain of all others to insure its own rapid destruction while producing the least possible circulation and effect on the metal. An enormously high temperature is necessary not only to render pure iron fluid, but an excess over that temperature is necessary to allow it to be transferred to a casting ladle, and therein be retained in a fluid state during the time necessary to quietly pour it into numerous moulds. The great problem I had to solve was how to generate and retain this enormously high temperature, for on any system of heating fluids we have two antagonistic operations going on—viz., the production of heat and its loss by radiation and absorption by the vessel in which the process takes place, and this particular case is further complicated by the rapid absorption and carrying off of heat by the incombustible portion of the air forced through the metal, hence it becomes a question of time; heat is always flowing away, and if the accession of heat went on at the same pace, we should never raise the temperature of the metal, and this points at once to the necessity for an extremely rapid production of heat; this rapid production of heat means such an intimate admixture of the combustible carbon and silicon with oxygen as will produce the necessary temperature in a few minutes, otherwise the heat would be dissipated and

the fluidity could not be maintained. So intimate is the mixture of carbon and oxygen in gunpowder that its combustion becomes instantaneous and no heat is lost, and in the Bessemer converter a well-arranged set of tuyeres blowing vertically upwards produces such an intimate admixture of oxygen and carbon as to create a succession of small harmless explosions, and hence fixes a limit to the safe diffusion of these combustible elements.

A converter with a group of seven tuyeres, each having seven separate passages through them, will direct vertically upwards 49 separate streams of air through the metal; this air dividing itself into countless thousands of small globules rushes upward, producing a light column of mixed iron and air, while the denser portions of the iron forms descending columns, and keeps up a powerful circulation, equalising the temperature and the rate of combustion, while a single nozzle pointing downward, as tried by Kelly, will not diffuse the air throughout the mass, but the air will rise up all around the nozzle and soon melt and destroy it. Air applied in this manner can never set up that amount of circulation and vivid combustion throughout the whole mass, which is an absolute necessity if fluid malleable iron is to be produced and cast into ingots, conditions absolutely impossible to arrive at in a shallow open vessel with one tuyere blown downward.

Indeed, Mr. Weeks is constrained to admit that Kelly could not make fluid malleable iron in his apparatus owing to its inherent defects in principle, which Kelly had not scientific knowledge enough to perceive or mechanical skill enough to remedy.

The precise words which Mr. Weeks adopts from Mr. Holley in this confession of the failure of Kelly to produce fluid malleable iron are as follows:—"Mr. Bessemer's invention consists in the mechanical means for intimately diffusing the air through the mass of iron to such an extent that the mechanical changes take place with sufficient rapidity to leave the mass fluid after the carbon and silicon have been removed; while the means employed by Kelly were not adequate to carry the process to the same extent." Hence with his one tuyere blowing downward, Kelly could not, and did not, produce fluid malleable iron; and could not, and did not, make an ingot; and could not, and did not, carry out the Bessemer process, which consists in the production of ingots of cast steel by forcing numerous streams upwards through the molten crude or cast iron; this failure of Kelly was the result of his entire ignorance of the essential principle on which the Bessemer process is based—viz., the rapid diffusion of minute fiery bubbles throughout the entire body of the metal under operation.

This abortive attempt of Kelly (if ever made) was, by Mr. Weeks' own showing, abandoned some years before I read my Cheltenham paper, having never served any useful purpose whatever.

Had Kelly patented his invention, had he read a paper on it before any scientific institution, or had he published an account of it in the public Press, it might have been said that a published account of even this most unsuccessful and abortive attempt would have acted on other minds and suggested a more perfect system; but Kelly did not in either of these ways, or in any other way, make known or convey any knowledge to the outer world as to what he was trying to do, and hence his labours have not by the smallest possible increment advanced the general stock of knowledge or influenced to the most infinitesimal extent the progress of steel-making either in America or elsewhere. All that Mr. Weeks has succeeded in doing is to show that an American citizen, if he ever had in his mind the idea that malleable iron could be produced by currents of air, could yet be so entirely devoid of mechanical skill, so hopelessly ignorant of the physical laws which govern the whole theory on which my invention is based, that, after pottering over his ill-devised schemes for a number of years, he failed hopelessly, and gave it up, having never benefited the world to the smallest possible extent. He never even thought it worth while to patent his invention during all the nine years from 1847 to 1856; but as soon as he found that my invention was agitating the whole iron trade of Great Britain, he woke up and commenced a fierce fight with affidavits in the American Patent Office, after I had already obtained my patent in America, and after all my English patents were published in Blue-books, which at the small cost of 6d. each were open to Kelly's and every one else's inspection; in them they could see every detail of my several inventions. Then it was, we are told, that "Pompey was very like Caesar," and that there was a wonderful identity between Kelly's invention and mine, but this similarity did not come about by my patenting in America an apparatus with one tuyere blowing downwards.

Any one would have thought that a person in Mr. Weeks' position must have had the honour of his own country more at heart than to drag such a lame and disgraceful story from the obscurity in which, to the honour of America, it had for 40 years been buried.

The fact of Kelly obtaining a patent in America after mine, rendered it necessary for all the manufacturers of steel in America to work under both patents, so all the trade knew perfectly well what Kelly's title to be called an invention really was, and with this full knowledge they unanimously joined in always calling it the Bessemer process. The Americans have, with this knowledge before them, elected me an honorary member of the American Society of Mechanical Engineers, and also an honorary member of the American Academy of Arts and Sciences, and in several parts of the United States, where Nature has richly endowed them with those aids to civilisation, coal and iron, manufacturing cities have been established to which by common consent, they have given the name of Bessemer.

"Thus we have the rapidly increasing and important city of Bessemer, Gogebec County, Michigan; the city of Bessemer, Alabama, with its mayor and corporation, its street tramways and electric lighting, and its large manufacturing works, public schools, and numerous churches. There is also the city of Bessemer, Lawrence County, Pennsylvania, the seat of the great Edgar Thompson steel works, the largest in America. There is also the city of Bessemer, Boutetort County, Virginia, and the city of Bessemer, Gaston County, North Carolina."

Nothing could more clearly show the spontaneous recognition of a whole nation of the enormous benefit that the Bessemer process has conferred on the trade and commerce of the United States.

The great wave of excitement produced on the public mind throughout Europe by the announcement of my invention at Cheltenham soon forced its way across the Atlantic, and created a great sensation among the iron producers of the United States; among other eminent men, it attracted the most earnest attention of Mr. A. S. Hewitt, whose high position is fully recognised throughout the United States, and who made the following statement in reply to Sir James Kitson, the honoured President of the Iron and Steel Institute, when Sir James was in America in 1891. Mr. Hewitt said:—"Mr. Bessemer read his celebrated paper describing the process of producing steel without fuel at the Cheltenham meeting of the British Association for the Advancement of Science in the summer of 1856. An imperfect report of this paper was published in the journals of the day, and attracted my notice. The theory announced seemed to be entirely sound, and the apparatus simple and effective. I gave orders at once, without further information



than that derived from the published report, to erect an experimental vessel for the purpose of testing the possibility of producing steel direct from the blast furnace. In the same year in which this paper was read, the experiment was tried at the furnace of Cooper and Hewitt at Phillipsburgh in New Jersey, and the result served to show beyond all doubt that the invention of Mr. Bessemer was one which could be successfully reduced to practice."

Now, if Kelly's nine years' pottering had created the smallest interest in America, surely a firm like Cooper and Hewitt would have known it and would not have been so anxious to prove the fact as at once to have put a Bessemer converter in operation on an experimental scale.

Mr. A. S. Hewitt, who is a Past President of the American Institute of Mining Engineers, said on the occasion of their meeting at Washington on February 22, 1882:—"My firm made an effort within six weeks after the famous Cheltenham paper was read in 1856, to see whether pig-iron could be thus converted into steel. It was three or four years after that that Mr. Holley's attention was called to the matter, and he went to Europe and brought back for his friends the control of that patent."

So that Mr. Holley was not in any way interested in this question for some years after Kelly knew all about my several patents, and had plenty of time to shape his invention so as to square with mine, even to the making of a moveable converter, which Mr. Weeks says was "an infringement on Bessemer's converter." It is something to get from Mr. Weeks the direct admission that Kelly had made an infringement of my patent. Why is he not more candid?

No sooner were Bessemer steel rails produced in Sheffield than American railway managers began to purchase them, and so important were they deemed to be that thousands of tons were sent to America, realising the almost fabulous price of £30 per ton; and when America began to make their own steel rails, thousands and tens of thousands of tons of Bessemer pig iron were sent to America from this country to make Bessemer steel with. This Bessemer pig was made by furnace charges invented and dictated by me, all the hematite iron previously made in England entirely failing to make workable steel.

Nor must it be forgotten that the Bessemer converter, with its hydraulic moving gear, and the hydraulic casting crane and apparatus, the ingot cranes, the valvular casting ladles, pair of vessels arranged in a semi-circular pit, the conical moulds, and, in fact, the whole plant, outfit, and arrangements of the American steel works, are the patented inventions of Henry Bessemer, although somewhat modified in their mechanical details by the late Mr. A. L. Holley, so as to suit the American practice, but Bessemer's patent machinery is still used, with scarcely a deviation in detail after a period of nearly 40 years, in every country in Europe where Bessemer "steel is made."

The British Patent Office shows all the successive steps in the development of my invention, and with these evidences of its origin and vitality scattered all over Europe and America, it is simply an outrage on the man who has done all this, and to whom America is so deeply indebted for the great extension of her manufactures, her commerce, and her prosperity, and to set up as the original inventor of the Bessemer process a man whose abortive schemes have not added one tittle to the public store of knowledge, or benefited the world or even his own country to the value of a single cent; it is nothing less than an outrage on the common sense of the scientific world.—Yours truly,

HENRY BESSEMER.

## THE GOLD FIELDS OF DUTCH GUIANA.

TO THE EDITOR OF "THE MINING JOURNAL."

SIR,—In your issue of February 1, I read with much interest an account of the 23rd annual dinner of the old students of the Royal School of Mines. The Chairman, in submitting the toast of the evening—"The Mining and Metallurgical Industries"—spoke of "one of the most pressing needs of modern civilisation is a rapid and large addition to the world's existing stock of gold." In the present rush of investors towards South Africa, one of the most prolific gold-producing regions has been overlooked. I allude to Surinam, or Dutch Guiana, in South America. This almost unexplored territory abounds in mineral deposits. All mining heretofore done has been of the most crude and primitive order, being confined strictly to alluvial washings, with long-toms and sluices, until quite recently no mining machinery has been utilised, and mining there is still in its infancy. Notwithstanding these simple methods employed in extracting gold, the results have been most prolific, and persons totally unacquainted with modern modes of mining have acquired large fortunes, notwithstanding the great loss of the precious metal by waste, and theft by employes. The far interior of this colony has never been prospected to any extent, and that there are yet undiscovered deposits of gold and quartz which will richly pay the investigator, no one can doubt who has visited this region. I spent some two years in this colony, and know whereof I speak. More than one expert has expressed the opinion that the Guiana district is destined to become the greatest gold field in the world. Nothing has been done towards developing quartz, except in a very few instances, by experienced miners. There is a lamentable lack of experienced miners, which has been one thing that has kept this country far in the background. The Government has done practically nothing towards opening up and developing the interior of the country. This vast deposit of mineral wealth is lying dormant, awaiting the talismanic touch of capital and enterprise. Fortunes are buried amid the tropical tangle and vegetation of these wilds. I shall be pleased to give an account of some gold-producing sections that came under my immediate notice while in that country.

A. I. MATHER.

Rockland Maine, U.S.A., March 4.

## REVIVAL OF WELSH MINING.

TO THE EDITOR OF "THE MINING JOURNAL."

SIR,—In the article on "Revival of Welsh Mining" in last week's Journal, the account pertinent to the subject was very meagre, resembling more a professional lecture on geology to students. In one paragraph there were scathing remarks as to waste of money and incompetency of managers in Cardiganshire, through ignorance of geology.

This is rather hard upon poor Cardu, and I beg leave to affirm geological knowledge is not always necessary, nor a panacea for successful mining. Geology at its best is but an unsatisfactory prevarication, and we have yet to learn what assistance it has given the practical miner.

I admit there have been in many instances fruitless expenditure of money at surface. Is Cardiganshire alone in this? The reason for this cruel waste is owing to worthless advice by consulting engineers and others having pecuniary interest in mechanical appliances, who boss the show for their own advantage, and not the managers, although some are perhaps unacquainted with the rudiments of geology, yet decidedly are conversant with the various features and peculiarities, &c., of lodes in their own and neighbouring districts, besides, what is more essential, know

when and how to direct men to put a piece here and to take down the lode there. When the consulting engineer from the big town pays a professional visit, he generally says to the resident manager, "Well, underground is the best place, but I will stay up for once." He then goes around in search of sites in most unsuitable places, erects inappropriate and unnecessary machinery. Result—chaos, ruinous waste of money. This want of ordinary mechanical skill is shifted on to other shoulders, and we are now told this is through managers not having studied the rudiments of a theory termed Geology.

With pleasure I observe reference to the best modern milling plant at the Parc Mine, and more so since it was reconstructed by a manager from Aberystwyth.

The huge heaps of tailings stated containing high percentage of silver-lead as far as Cardiganshire is concerned have been dressed over and over, and in no way will be beneficial as an investment.—I am, Sir, your obedient servant,

Ystrad Menrigh, R.S.O., near Aberystwyth.

## COAL IN ESSEX.

TO THE EDITOR OF "THE MINING JOURNAL."

SIR,—Kindly accord me sufficient space in your invaluable columns to say that having regard to the enormous consumption of coal—present and the future—by reason of the ever-increasing carrying power of our mercantile fleet, let alone the increase in respect to our Navy, that in lieu of our being supplied with this necessary fuel from such far off distances, there is without question and upon sound geological data an unlimited amount of coal within the very gates of London, underlying the vast littoral of the Thames—say, for instance, from and around Romford right away to the river. Already a coal-loring company have made search in the county of Essex for the coveted "black diamonds," but without success, for the cogent reason that their experiments have seemingly been made beyond the carboniferous region, whereas had they confined their operations to the above recited littoral, their endeavours would no doubt have ere this been crowned with success on going down to a depth of (say) 1000 feet below the surface.

Any company or syndicate, therefore, having the courage to search in the locality above indicated, I am sanguine their attempt would be well rewarded.

ALFRED BARTON.  
Bowyer Villa, Thanet-place, Romford, Essex, March 16.

## PARDY'S SYNDICATE.

TO THE EDITOR OF "THE MINING JOURNAL."

DEAR SIR,—Kindly allow me through the medium of your paper to give the public some idea as to what Pardy's Syndicate have got here. First (Guy Fawkes reef).

I.—There is a drive on the reef about 500 feet. At the mouth of the drive the reef split into small stringers, and at 250 feet they pinched out; the other part of the drive is a blank. To the west a crosscut was put in from the face of the hill, but nothing was found and it was stopped. At present they are working about 150 feet from the mouth of the drive on a patch of quartz.

II.—Pardy's range is the western extension of the Guy Fawkes. There is no outcrop or prospecting done on this block, and the western portion of the Guy Fawkes having no reef, they have not looked for anything on Pardy's range.

III.—Inyamasauga Block. This block is to the east of Guy Fawkes. A drive in the gully opposite the Guy Fawkes drive shows some loose blocks of quartz with no walls. The drive is in about 10 feet, and nothing solid. A few feet from this drive there is no outcrop to be found, or any prospecting done.

Mr. Pardy is on his way to England to give the public a chance to take up some shares in a piece of worthless swamp he calls rich alluvial. I was to have prospected it in a place or two, and then given him a favourable report on it; there being no possible chance of draining the swamp, and no indication of gold, I declined. I have had a good many years practical experience in gold mining in all its branches, and am well known in all the mining centres in Africa, and I consider it the duty of any person to warn the public against worthless properties.—I am, dear Sir, yours truly,

Massi Kassi, January 28.

JOHN K. LESLIE.

## BLLENDE MINING AS AN INVESTMENT.

TO THE EDITOR OF "THE MINING JOURNAL."

DEAR SIR,—In the year 1853 the average price of blende was £2 7s. per ton, now the price for a similar quality is £1 15s., or practically 100 per cent. greater, consequently many mines that cannot pay on lead ore alone are turning their attention to blende. It may safely be calculated that where a mine has been rich in lead ore, as the levels are being opened out in depth, that just in the lower beds of the limestone, and over the Silurian rocks, vast quantities of blende will be found—in fact, such is the case in mines I have inspected. Most of these mines have paid large dividends, but, unfortunately, never laid aside any of the profits for working capital, and consequently are not in a financial position to sink the shafts into the large quantities of blende known to exist below the bottom levels. Here there is a rare opportunity for investors. In one case, £20,000 will develop such a large area, that 500 tons per month can safely be relied upon at a big profit. In another mine £10,000 would develop about 300 tons per month. I would suggest that a syndicate be formed to provide the necessary working capital for these and other blende mines. Very often gold is associated with the blende, more especially in the Silurian formation, and assays of picked samples have shown up to 1200 ounces of gold per ton. In the olden times only the zinc contents were paid for; now, however, the whole of the assay contents are paid for, which besides gold very often silver is found.—Yours faithfully,

JOHN L. M. FRASER.  
Consulting Mining Engineer.

162, Ebury-street, London.

## NEW ISSUE.

### CRIPPLE CREEK PIONEERS (LIMITED).

This company has been formed with a capital of £50,000, in shares of £1 each, of which 33,000 are now offered for subscription, to carry on, as the prospectus states, "the usual business of a development, promoting, and finance corporation, and to undertake any business commonly undertaken by bankers, financiers, promoters, and concessionaires." This is further amplified by the statement that "its operations will be chiefly in connection with the mining industries in the recently discovered gold fields of Cripple Creek, Colorado, U.S.A. It is, in fact, intended to be the principal parent corporation in connection with this new district, similar to the large companies so successfully operating in South Africa and Western Australia. Being a pioneer company, and almost the first English company to turn its attention to Cripple Creek, it has an exceptionally wide scope for successful and remunerative business."

## PARIS LETTER.

(FROM OUR OWN CORRESPONDENT.)

French interests in the Transvaal.—Firmness of Kaffir shares.—Mining in the Colonies.—Gold mining in Madagascar.—Important ironstone mining enterprise.

THE general conditions of finance at the present moment are far from being favourable to a recovery in any branch of the mining market. The cloud which continues to hang over international stocks must serve as a serious impediment to mining enterprise, and nothing is likely to be done until the outlook is more reassuring, and capitalists are able to see that they may safely embark upon fresh enterprise abroad. In the Transvaal the period of unrest does not seem yet to be by any means at an end, but investors entertain little fear but that matters will soon settle down in that country upon a satisfactory basis. In the meantime, the falling off in the production of gold at most of the leading mines since the beginning of the year through the scarcity of labour and the consequent partial stoppage of the stamp batteries, has brought home to French holders of South African scrip the necessity of doing something to relieve the industry from the disabilities that at present weigh upon it; but, unfortunately, they have no remedy to suggest except that President Kruger should be advised in a friendly way to afford every protection in his power to the mining companies. His dilatoriness in doing this, so far, has caused a certain surprise in mining circles; but, nevertheless, there is a general impression that Mr. Kruger is not the man to imperil the prosperity of his country by placing difficulties in the way of the Rand industry, and shareholders feel that they can do nothing but to possess their souls in patience. At the same time, they do not hesitate to assert that the trouble of carrying on operations on the Rand is greatly exaggerated by the English companies themselves, who are seeking to create a bearing manœuvre on the Bourse, in order to cause a transfer of shares from Paris to London before the inevitable rise in values takes place. Investors contend that but for the English an advance in prices all round would have declared itself some time ago, and they do not believe that the "bears" will be able to resist the movement much longer. Holding this view, they are firmly resolved not to realise their scrip in the present state of the market, and this attitude has prevented the Bourse from participating in the weakness of the foreign exchanges.

The efforts that financiers are making to render the Bourse independent of other exchanges are undoubtedly meeting with a certain success, though it is to be questioned whether it will ever be possible to free the French market entirely from the influence of foreign speculators. While, however, investors allow themselves to be led by the two great financial syndicates which have been formed ostensibly with a view of consolidating French interests in the Transvaal, and of protecting them from the machinations of the foreign speculator, the latter will find a much smaller field here than formerly for carrying on his operations. It is an undoubted fact that the *coulisse* and the *parquet* and the leading banks in Paris have come at least to a tacit understanding to support the investor in South African shares, and at the same time to prevent any undue inflation of prices. They seem now to have secured entire control of the market. They have imparted confidence to the investor who holds on to his scrip through good and evil repute, and when this confidence shows itself in a rush upon scrip and a tendency towards a heavy rise in values they promptly show them clearly enough that their own safety lies in the solvency of investors, and they are firmly resolved to resist any repetition of the reckless gamble which brought them within an ace of ruin. This is, of course, an excellent thing for the mining market, which has been able to preserve a healthy tone under conditions which, at another period, would have resulted in wholesale realisations, and the loss of a considerable amount of money. While foreign holders were selling, French investors have been buying up on a small scale, and though the business done has not been considerable, it has yet resulted in prices coming back to a fairly satisfactory level. Now and then compulsory realisations or selling by timid holders have momentarily depressed values a few points, but on the whole prices are maintained with only a little fluctuation, mostly in an upward direction. This week some of the leading shares, such as Consolidated Gold Fields, Ferreira's, Randfontein, Robinson Mines, and Kleinfonteins, have been purchased more freely, with the result that the quotations have advanced a few points, but all the other securities are practically unchanged. On Thursday the quotations of the principal shares dealt in were as follows:—Buffelsdoorns, 105 francs; East Rand, 170 francs; Chartereds, 125 francs; Ferreira's, 482 francs; Consolidated Gold Fields, 343 francs; Geldenhuis, 110 francs; Randfontein, 81 francs; Robinson Mine, 246 francs; Robinson Banks, 179 francs; Shebas, 55 francs; Transvaal Consolidated, 60 francs; Kleinfontein, 102 francs.

While there is little evidence yet of a revival of mining enterprise in the colonies, there is some chance of a good deal of money being turned into these channels as the result of the railway policy which has now been inaugurated by the Government. Both in Tonkin and in North Africa the magnificent mining resources are rendered practically valueless by the absence of transport facilities. Coal, phosphates, iron ore, copper, and other minerals and metals exist in great abundance, but it does not pay to work them because the heavy cost of transport and the royalties leave little or no profit to the mining companies. It is to be feared that it will not be possible to secure any relief from the local contributions in the shape of royalties and dues of all descriptions, but it has been proved that the mines can be worked profitably if only the minerals can be conveyed economically to the ports of shipment. There is some ground for believing now that capitalists will be afforded such assistance, as the railways being laid down by the Government cannot fail to provide the necessary facility for transport. Yet even when this is done a great deal will be required to induce capitalists to sink money in the development of the mineral resources of such colonies as Algeria and Tonkin. Though we heard so much lately of the despoiling of French companies of phosphate concessions that had passed into the hands of British capitalists, we do not see any particular desire on the part of French capitalists to take over the concessions which are being unjustly wrested from their legitimate owners. Nor have capitalists here ever been favourably disposed to Tonkin as a field for the profitable investment of their money, and the coal mines and other properties in that country continue to be worked with foreign capital. The fact is that the French have not sufficient faith in the administration of their colonies, which more often than not interferes sadly with enterprise of all descriptions, and they prefer to place their money in English hands, where they know that it will be properly utilised, and that they will get the best possible return upon their outlay. Notwithstanding this, they



will no doubt show a readiness to interest themselves in the mining development of the colonies, if they are encouraged to do so by the more enlightened policy which the Government seems to be carrying out.

The mining possibilities of Madagascar is a theme upon which political economists have desecrated for a long while past, but so far very little has been done to turn them to good account. The only French concern that is pursuing operations in that country is the Suberbierville Gold Mining Company, which was formed with a capital of £600,000 to exploit the concessions taken over from M. Leon Suberbie. The supposed magnificent wealth of these concessions has long been questioned by shareholders, who were getting somewhat concerned at the absence of definite information upon the gold bearing value of the property in which they were interested, and it is only this week that the company has sought to allay their apprehensions by issuing a report. According to this document there exists a great deal of visible gold, but so far only a couple of veins have been worked. The yield up to now has been one gramme of gold per labourer per day, though it is said that quite twice this amount has been lost by theft. The company is now setting up the new plant which it lately took out from France, and it hopes to begin operations on a systematic scale shortly.

The company which was lately formed to work the rich iron ore deposits at Banca, in the Basses Pyrenees, has increased its capital with a view of exploiting a bed of mineral known as the Filon d'Ustéleguy. This is said to have a length of about 3 kilometres, and a thickness ranging from 3 to 12 metres. The mineral is a spathic ore, which, when roasted, yields from 56 to 60 per cent. of iron. These deposits have long been famous for their remarkable richness, but, so far, they have not been worked with success, owing to the absence of railway facilities. A new line is, however, now being constructed, which will permit of the ore being delivered at Bayonne for shipment at 12-25 francs a ton—that is to say, under conditions which will allow of its competing with the Bilbao ore.

## MINING IN NEW ZEALAND.

(FROM OUR OWN CORRESPONDENT.)

**G**REAT activity is being displayed in the mining industry throughout the whole length and breadth of this gold peninsula. At Waihi, tenders are solicited by the Waihi Gold Mining Company for the construction of water mains for the supply of water to the new reduction works now in course of construction. At Waitekauri, the most important company in this district is the Waitekauri, or what was formerly known as the Golden Cross. Work in connection with this mine is being prosecuted in almost every direction. The contractors for the erection of the cyanide and crushing plant are making excellent progress, whilst the various works in hand on the mine are all being steadily advanced. The Silverton Company at Waihi, under the able management of Mr. H. H. Adams, are pushing on the various works without a hitch. The reduction plant is rapidly approaching completion, whilst the works on the mine continue to reveal large lodes, producing excellent assay results. These developments are, I believe, to the north of the main crosscut. When they commence their explorations in a southeasterly direction then they will meet with the Gladstone system of lodes. Here there is every probability of a rich section of lodes being intersected. In addition to their present acquisitions the Silverton Company should rank as one of our leading producers of bullion. That it is a most important mine is beyond question, and its possibilities are very great indeed—more so perhaps than what has been given credit for at Karangahake.

The Woodstock United Gold and Silver Company have called tenders for the supply and erection of a 30 stamp dry crushing mill, also 12 percolating vats, and other appliances necessary for the successful treatment of their unlimited supply of ore.

When I say unlimited, at present the supply appears ample to keep them profitably employed for some time to come. There is one important acquisition which the company possesses, and that is a thorough practical man as manager. I refer to Mr. John McCombie, a man of practical experience in all classes of mining, and more especially that particular class of ore which is contained within the lode system of the Woodstock. Another important property in this district is the New Zealand Crown Mines. This company has a magnificent area embraced within their holding, and also a very efficient cyanide plant, which I believe they intend largely increasing during the course of the present year. At the mine they have driven upon their large reef at their No. 6 level, for a distance of 1300 feet, which gives them a height in back of fully 1400 feet. The country they are now entering is quite unexplored, and the ore coming to hand is of a highly remunerative class. Another company here in this district, carrying on operations under the style of the Talisman Gold Mining Company, is, perhaps, one of the richest mines on this field, inasmuch as the ore lodes are worth from £5 to £12 per ton on an average. They have a 10-stamp reduction plant, which is merely an experimental one, and no doubt this will be largely improved upon as the work proceeds in the mine and a greater extent proved on the lodes.

### Thames Proper.

Here the various companies have resumed operations—two with the assistance of British capital, and the others are conducting their present operations out of the product of gold won from their lodes. The two companies worked by outside capital are the Mountain and Norfolk. Both these companies are conducting a series of works which must eventually lead to successful results. So far, the Queen of Beauty works are confined to excavating a site for their winding machinery. During this week the Hon. J. A. Cadman, Minister of Mines, accompanied by Mr. Gordon, Government Consulting Engineer, are expected here to consult with Mr. T. A. Dunlop as to the size of the shaft to be sunk. This is to be carried out with the assistance of the Government subsidy of £25,000. This work is a gigantic undertaking, and requires very careful consideration, inasmuch as the depth to be sunk—viz., 2000 feet—will necessitate the erection of the latest and most substantial machinery procurable. With two 25 inch lifts, which it is intended to put down, they will be in a position to cope with more water than what will trouble them; for instance, the present big pump forks all water to a depth of 700 feet with a single 24 inch lift. In my opinion, the company will not be troubled with much more water at 1500 feet deep than what they are now raising with the big pump.

Reviewing the Norfolk Mine and its future prospects, probably a few notes regarding them may be of special interest to English investors.

The Norfolk is situated in the Tararu district, which lies about 2 miles north-west of the Thames, and consequently its operations are directed to a distinct reef system to that worked by the Mountain, Queen of Beauty, and May Queen companies. Several levels are in progress upon the north and south trend the City of Dunedin, Californian Ophir, and Parallel lodes,

all of which are at the present time producing ore worth from 16s. to £20 per ton. Although the ore yields that by assay, the company's present system of treatment is entirely a poor one, and fails to extract more than 20 per cent. of the assay value of the ore. This, of course, is now occupying the chief attention of the company, and it is expected that before long this defect will be remedied by the introduction of cyanide of potassium to deal with the crushed ore after it leaves the amalgamating plates. When once this object is thoroughly accomplished, then we may look forward to regular returns, which must eventually amount to dividends. As can be seen by the following, the ore treated at the company's mill during the past month is a proof of the payableness of the ore bodies embraced within the company's area; 300 tons of ore were treated from all parts of the mine for the payable return of 164 ounces 12 dwts. of melted gold, which realised on being sold £532 12s., its assay value being 64s. 10d. per ounce.

There is not the slightest doubt existing as to the genuineness of the mine. The lodes average in size from 2 feet to 16 feet, and all gold-bearing, the metal being of exceptional high value.

### ST. HELEN'S DEVELOPMENT SYNDICATE, LIMITED.

**A**N advance copy of an elaborate report as to the position and prospects of the St. Helen's Development Syndicate, from the well-known pen of Mr. Frederick G. Shaw, F.G.S., general manager to the company, is before us, and from the importance of the company's interests in a country that offers considerable promise for the future, is worthy of careful attention. The report is obviously the fruit of considerable labour and a careful inspection of the comparative merits of the various gold fields in Matabeleland. For four months Mr. Shaw continued his tour of inspection, and by the end of that time his mind was fully made up as to the promising outlook of the industry in the colony, practical expression being given to his opinion by the decision to invest money on behalf of his syndicate in that quarter of the globe. Circumstances were, as he himself states, particularly favourable at that time for advantageous investment in the field, since the efforts of earlier prospectors in that region did not seem to have been characterised by the introspection, which enabled them to select and appropriate the richest areas at the general disposal. There was, consequently, a wide field for the increase of Mr. Shaw's discretion, which, as would appear from the report before us, was energetically and, at the same time, judiciously devoted to the services of the syndicate. The results of Mr. Shaw's labours are found in the tabulated statement presenting the different reefs which lie within the company's properties, together with figures of assay—running in many instances very high—which show their probable yield when a sufficiency of development work has been carried out. The report before us possesses an interest which is by no means limited by its application to the shareholders in the syndicate itself, since Mr. Shaw, writing after considerable experience in the colony, enters into some comparison of the merits of the different districts of Matabeleland, in which he has been led to acquire interests. There is, for instance, the Sinanombi district, where the company owns, practically speaking, every old working of importance. A fair amount of work has here been done, and has resulted in the discovery of reefs which are both rich and strong. There is an abundance of timber here, while the presence of creeks and small rivers suffices absolutely to preclude any possibility of a water difficulty. It is in this district that the syndicate owns the Theta, the Besobery, the Constitution, and the North Allerton properties, besides several others of minor importance. The Mavin districts appears to be similarly satisfactorily situated in regard to working facilities, but it is yet too early to speak definitely as to the prospects of this field, since the amount of developments hitherto carried out is not sufficiently large to justify a decided improvement. Mr. Shaw speaks highly of the stands which he has obtained in the Gwelo town, which, in many respects, he considers to have a unique situation as a mining centre. In fact, it may be interesting, in view of the interest which has been awakened on the subject of Gwelo, as a mining area, to quote Mr. Shaw's own remarks in this connection, which, from his personal acquaintance with the district, no less than from his extended experience as a mining engineer, may be said to carry considerable weight. In speaking of the situation of the town, he says:—

"To the south and east the gold fields extend clean away to the town of Victoria, a distance of over 75 miles. To the north the gold fields extend a similar distance to the lower Gwelo, passing through the Mavin districts, the Sinanombi district, and also being the nearest town to the Sebarikwe district and the Rony Taylor Concession. It lies on the high road between Salisbury and Bulawayo; it is situated in a healthy position, elevated some 5000 feet above the level of the sea. I was enabled to buy six stands in this town at the last general sale for a very small sum. I consider that the future advance of the town is certain, and the stands will bring in a handsome revenue before two years." Seven miles from Gwelo is the Guinea Fowl reef, on which the syndicate have pegged off 30 claims, some of the assays from which run as high as 2 ounces 4 dwts. and 1 ounce 7 dwts. to the ton. At Selukwe the interests of the syndicate were for some time put into hazard by the popularity achieved by some properties in which they were concerned. "Nothing but the most prompt and diplomatic action," Mr. Shaw says, prevented them from losing the result of the operations of the ground in their possession after the true trend of the reef was discovered. In the B-mbei district the syndicate have acquired the Queen's Extension, where two shafts have been sunk, the reef here exposed giving an average at 21 dwts. to the ton. One of the principal reflections brought into mind by this report is the vast extent of the interests owned by the syndicate. There are, for instance, the Eldorado farms, in the Inseza district, which extend for 122,000 acres, and are said to be admirably situated in the middle of the Inseza gold belt. "The celebrated Nellier reef," says Mr. Shaw, "runs for 7 miles through our ground, and over 2200 claims have been pegged out on these farms. The syndicate, it appears, are fortunate in possessing 3525 feet on the pick of this reef, a fact which would appear with additional emphasis when it is remembered that the reef in question is "supposed to be one of the finest, if not the best, reef in Matabeleland that has been so far discovered. It is pegged for over 14 miles, and everywhere along it the stone is extremely rich. The fact that the next claims to ours were floated locally in Bulawayo during the late slump—that is to say, two months ago—for £25,000, and by the local people subscribed ten times over, will give you some idea of the estimation locally held as to this reef." Of the remaining districts with which the syndicate is concerned, perhaps the most important is the Belingwe gold belt, through which quite a number of very promising reefs are said to run. An additional fact, which from two points of view looks very well for the company's future prosperity, is the possession by them, under exceptional terms, of 25,000 acres of freehold forest land. There is no occasion here to insist upon the necessity of a good supply of mining timber for successful mining

operations, but in the event of this vast extent of timber not being required for such purposes, it is obvious that a very high trade value must attach to the timber as a commercial product. In this connection Mr. Shaw says:—"I have had repeated offers from the timber merchants in Bulawayo to be allowed to cut timber on these farms; they have offered for this right £2 10s. per load for every load they cut. As we have an average of four loads of timber to the acre, this would amount on your land to £250,000 for the timber alone to these people. Two very fine streams—the Umgusa and the Inseza—run through these farms, and have a constant supply of water in them. Mills should be erected in one or two localities, and the timber cut and seasoned. A very fine revenue will be obtained from the sale of this timber in Bulawayo, while the future profit to be derived from supplying Johannesburg with this timber for mining purposes will be enormous. Johannesburg is receiving its timber from all parts of the world—America, the Baltic, Australia, &c.—having none of its own, and as our timber forests are the nearest and possess the finest timber for that purpose, I have no doubt that we can obtain at least double this price from that market."

With the labour question at an acute phase it is satisfactory to know that the present labour supply is deemed adequate for the work necessary to develop these reefs. In regard to the company's internal management, it is not quite so reassuring to find that in view of the distances intervening between the different districts, it will be necessary to appoint sub-managers for each district. This, however, was obviously unavoidable. In elaboration the report before us excels any that has issued from the Press for some considerable time, and the addition of several well-executed plans, showing the different gold districts in the colony, is a feature distinctly interesting. These are combined into one general plan, so that their relative positions in regard to each other and the central town, Bulawayo, may be apparent at a glance. Perhaps that part of the report which possesses the widest interest is the summary with which Mr. Shaw concludes, wherein the fateful question of the existence of payable gold in Matabeleland is brought one step nearer solution. The author is able to "emphatically assert that undoubtedly paying reefs have been discovered to exist in most of the 62 shafts" which he has sunk, following up this pithy and decided pronouncement with the important corollary that, "the reefs possess no great difficulties for work, and are conveniently situated for water and wood."

## LATEST FROM THE MINES.

### CABLEGRAMS AND TELEGRAMS.

**AUSTRALIAN DEVELOPMENT.**—Mr. Frank Nicholas, the consulting engineer, cables as follows:—"McKenzie Gold Mines (Glenloch). Have cut the vein in the main shaft. Some very fine specimens.—Kaniya. Developments opening up splendidly. Oritava. Developments opening up splendidly."

**BAYLEY'S REWARD NO. 1 SOUTH.**—The following cable, dated the 16th inst., has been received:—"455 ounces, 130 tons; this month's crushing."

**BRILLIANT BLOCK.**—Cablegram from the head office in Charters Towers:—"Have crushed (during the month) 197 tons of quartz for 1101 ounces of gold. The profit on the run is £200. The approximate value of the above return is £3790."

**BRILLIANT AND ST. GEORGE UNITED.**—Cablegram from the head office in Charters Towers:—"Have crushed during the month 1467 tons of quartz for 2506 ounces of gold. Have declared a dividend of 9d. per share, payable on March 23. The approximate value of this return is £8445."

**BLACK REEF PROPRIETARY.**—The following cablegram has been received from the head office:—"Borehole and shaft has cut the vein. Lode not well defined. Assaying—Spencer."

**BROWN'S CREEK.**—Cable just received:—"40 stamps running. Plates are looking well. Dam not yet erected. All the 60 stamps will be running in two weeks."

**BROKEN HILL PROPRIETARY.**—During the week ending the 12th inst. 6883 tons of ore were treated, yielding 528 tons of lead containing 128,354 ounces silver; also 1010 tons treated by amalgamating and leaching plant, producing 11,763 ounces silver. The price of the shares in Melbourne is £2 9s. 6d., and there are buyers.

**BIG BLOW.**—The manager cables, under date of 19th inst. that the mill, which started on the 13th inst., is running splendidly, and that the quartz is looking first-rate, but the water at present available is only sufficient to work five heads of stamps five hours per day.

**CENTRAL CHILI COPPER.**—The directors yesterday received from their manager at Pannullo, by cable, the following:—"Result of work for month of February: Mines produced, 1000 tons; ores bought, 930 tons; ores smelted, 2450 tons; regulus produced, 283 tons; net profit for the month, £635."

**DORIC.**—The following cablegram has been received from the manager at the mines in reference to the lode struck on March 1 in adit level No. 2:—"Low grade ore in abundance in sight; although low grade the mine can be worked to a good profit on account of abundance of ore and capabilities for cheap working. Have not yet got to the hanging wall."

**DUNDERBERG.**—The last advice from the manager report the completion of the raise to the surface, and extension of the drive on the reef, opening out further reserves of good ore. He cables on March 16:—"Result of assays from new workings as follows:—Assay, end of level to the south, value of ore \$82 per ton; end of level to the north \$29-50 per ton. Sample from winze \$13-75 per ton."

**EAST WEALTH OF NATIONS.**—Manager's weekly report cabled March 13 is as follows:—"Lease 1041, north shaft. 50 feet level driven 5 feet during the past week; reef is 4 feet 6 inches wide.—South shaft. Crosscut driven 8 feet. Lease 1043. Shaft is now down 60 feet."

**EXPLORATION (Alaska Mexican Gold Mining Company).**—Cablegram from Alaska reports the clean up for the month of February as follows:—"Period since last return, 29 days; bullion shipment, \$23,567; ore milled, 6625 tons; sulphurets treated, 163 tons; of bullion there came from sulphurets, \$8563; working expenses for period, \$15,789."

**FRONTINO AND BOLIVIA.**—The statement for the month of January is as follows—viz., 3173 tons produced 2406 ounces gold; tributors' gold, 152 ounces; total, 2558 ounces of gold. Estimated value of gold and sulphurets, £6743 18s; estimated cost, £5753 15s; estimated profit, £900 3s.

**GLENROCK CONSOLIDATED.**—The directors of the Glenrock Consolidated (Limited) have received a cablegram from the general manager, dated Coolgardie, 18th inst., stating that he has pegged out and applied for a 24 acre block in the Coolgardie gold field. There is no doubt this is the property recently reported on by Mr. Tinney, and on which he intended to sink a shaft for 50 feet, so as to prove the continuity of the lode at depth before acquiring leases. Lode reported driven on for



May Consolidated, Johannesburg.  
Roodopoot Central Deep, Johannesburg.



**C. PASS & SON (Limited), BRISTOL,**  
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 LEAD ASHES, SULPHATE OF LEAD, LEAD SLAGS,  
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**PRINCE OF WALES DOCK, SWANSEA.**  
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 Regular lines of steamers from America, Europe, &c.  
 Good prices can be obtained for low produce Copper Ores. Send  
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**COMPANY (Limited).**  
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**JAMES R. FOWLER, Esq.,** 14, King William Street  
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**GORDON WILSON, Esq.,** The Australian Gold Recovery Com-  
 pany (Limited), Charters Towers, North Queensland.

AGENTS FOR THE CASSEL GOLD EXTRACTING COMPANY'S  
 MANUFACTURES OF HIGH GRADE CYANIDE.

## COMPANIES AND LEGAL ANNOUNCEMENTS.

\*. Advertisements are inserted in this column at the rate of  
 8d. per line, with a minimum charge of 7s. 6d.

**THE MYSORE GOLD MINING COMPANY**  
**(LIMITED).**

NOTICE IS HEREBY GIVEN, that the TRANSFER BOOKS  
 of the above Company will be closed from the 11th inst. to  
 the 24th inst., both days inclusive.

By Order of the Board,  
**I. CROCKER,** Secretary.

Registered Offices:  
 6 and 7, Queen Street Place,  
 London, E.C.,  
 March 9, 1896.

**THE MYSORE GOLD MINING COMPANY**  
**(LIMITED).**

NOTICE IS HEREBY GIVEN, that the SIXTEENTH  
 ORDINARY GENERAL MEETING of the members of the  
 above-named company will be held at the Cannon Street Hotel, in  
 the City of London, on TUESDAY, the 24th day of March, 1896,  
 at 12 o'clock noon.

To receive the Reports and Accounts.  
 To elect Directors and Auditors in place of those retiring; and  
 for other General Business.

By Order of the Board,  
**I. CROCKER,** Secretary.  
 6 and 7, Queen Street Place,  
 London, E.C.,  
 14th March, 1896.

**THE NUNDYDROOG COMPANY (LIMITED).**

NOTICE IS HEREBY GIVEN, that the THIRD ORDINARY  
 GENERAL MEETING of this company will be held at the  
 Cannon Street Hotel, in the City of London, on WEDNESDAY,  
 the 25th day of March, 1896, at 12 o'clock noon.

To receive the Reports and Accounts.  
 To elect Directors and Auditors, and for other General Business.

By Order of the Board,  
**I. CROCKER,** Secretary.  
 Registered Offices:  
 6 and 7, Queen Street Place,  
 London, E.C.,  
 16th March, 1896.

**THE HAURAKI GOLD MINING COMPANY**  
**(LIMITED).**

NOTICE IS HEREBY GIVEN, that a DIVIDEND of 1s. per  
 share, free of Income Tax, will be paid on and after the 25th  
 day of March, 1896.

Holders of Share Warrants must lodge Coupon Serial No. 4 at the  
 Company's Office, 97, Dashwood House, New Broad Street,  
 London, E.C., three clear days for examination.

By Order,  
**W. J. LAVINGTON,** Secretary.  
 London,  
 16th March, 1896.

**TRANSVAAL CONSOLIDATED LAND AND**  
**EXPLORATION COMPANY (LIMITED).**

THE ADJOURNED THIRD ORDINARY GENERAL MEETING  
 of Shareholders of the above-named Company will be HELD  
 at the Offices of the Company, at PRETORIA, on MONDAY, the  
 18th of MAY, 1896, for the following purposes:—

- (1) To receive and consider the Profit and Loss Account, the  
 Balance Sheet, the Report of the Directors and Auditor  
 or Auditors, for the period from 1st January to 31st  
 December, 1895.
- (2) To elect Directors (except the Managing Director) in the  
 place of the present Board, who retire in the terms of  
 the Trust Deed, but who are eligible for re-election.
- (3) To fix the remuneration of the Auditor or Auditors for past  
 services, and to elect an Auditor or Auditors for the  
 ensuing year.
- (4) To transact General Business.

The Transfer Books of the Company will be closed from the 11th  
 to 19th May, 1896, both inclusive.

By Order of the Board,  
**C. MARQUARDT,** Secretary.  
 Pretoria,  
 16th March, 1896.

**FOR SALE, the following low-priced Shares:**

400 African Gold Consols—200 Tokotea of Hauraki 200 St. Augustine, 12s.  
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 6 Great Laxey, £1 10s. 300 ditto (3s. paid), 2s. 9d. 250 Western Witwaters-  
 500 Drakewalls, 1s. 100 Abbot (17s. 6d. paid), 10s. 6d. 250 ditto, 1s. 2s.  
 200 Waldens Find, 4s. 10s. 3d. 400 Sheba Queen, 4s. 6d.  
 50 Polberro, 9s. 50 Associated Gold 250 Londonderry Ex., 3s.  
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Apply, **W. SEWARD and Co., 7, Drapers' Gardens, E.C.**  
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**BIRMINGHAM.**

## The Mining Journal,

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 literary contributions should be addressed to "THE EDITOR." All matter  
 intended for insertion must be written on one side of the paper only.  
 The return of rejected manuscripts cannot be guaranteed. The Editor invites  
 correspondence and items of news or information from readers in all parts  
 of the World.

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 Stalls and Newsagents throughout the United Kingdom for 6d.

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 imum charge of 7s. 6d.; Sales by Auction, Publications, For Sale, Wanted,  
 &c., &c., 3d. per line with a Minimum charge of 4s.

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 had on application.

ADVERTISEMENTS (which should in all cases be sent direct to  
 THE BUSINESS MANAGER) can now be received for the forthcoming issue  
 of THE MINING JOURNAL, RAILWAY AND COMMERCIAL  
 GAZETTE, on FRIDAY, at 18, FINCH LANE, E.C., up till 6 p.m., and  
 at 3, DORSET BUILDINGS, SALISBURY SQUARE, E.C. until 9 p.m.

Editorial and Advertisement Offices:

18, FINCH LANE, LONDON, E.C.

Telegraphic and Cablegraphic Address: "TUTWORK, LONDON."  
 Codes used: "A.B.C.," "Morning," and "Universal."

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LONDON: MARCH 21, 1896.

## THE EXTENSION OF THE RAND REEFS.

WE have more than once drawn attention in these pages  
 to the excellent work that is being done by the  
 Geological Society of South Africa. As we do so once  
 again, we cannot help the thought that if all associations in  
 South Africa had been formed on such a purely scientific basis,  
 it would probably have been better for all concerned. We  
 have it on the high authority of BRETT HARTE that geological  
 societies in active gold fields are not always as peaceable as  
 they might be, and the members of the "Society upon the  
 Stannislau" do certainly appear to have been quite as bellicose  
 as scientific men ought to be. Nevertheless, even they restricted  
 themselves to "warfare with the remnants of a Palaeozoic age,"  
 which are decidedly less dangerous than the Maxim guns of  
 modern civilisation, and, upon the whole, even with the possi-  
 bility of similar results to those depicted by the American poet  
 before us, we cannot help thinking that the members of the  
 Reform Committee would have advanced the interests of the  
 gold industry which they represent better had they put in all  
 their spare time with the Geological Society of South Africa.

One of the most important contributions to this Society's  
 Transactions, so far, is the paper by Mr. D. DRAPER, the first  
 part of which we reproduced last week; it is an attempt to  
 solve one of the most difficult problems connected with the  
 blanket beds of the Rand, and deserves the careful study of all  
 connected with or interested in gold mining on the Witwaters-

rand. Whether the views put forward by Mr. DRAPER be  
 ultimately proved to be right or wrong, they seem at first  
 sight to be sufficiently well thought out and sufficiently  
 plausible to beworthy of a thorough investigation. It has,  
 of course, been well known to everyone interested in  
 South African gold mining that the blanket series of the Rand  
 terminates pretty abruptly both to the east and to the west,  
 beyond Driefontein on the one side and beyond Rooodepoort on  
 the other, and no one has been able to say so far what becomes  
 of these valuable deposits. Mr. DRAPER's present paper refers  
 entirely to the western extension, and is an attempt at discover-  
 ing whereabouts these reefs should be looked for beyond Rooode-  
 poort. Beds of gold-bearing conglomerate are known, and  
 under the names of Botha's reef, &c., have been worked  
 further west, but they have never been successfully  
 correlated with the beds of the Johannesburg series,  
 though often assumed to be the extension of the Main reef.  
 In order to follow Mr. DRAPER's reasoning, it is necessary to  
 understand the succession of the beds as they are at present  
 known. To the north of the gold-bearing beds is a huge  
 mass of granite, resting against which, in a nearly vertical  
 position, or with a steep dip to the south, are a series of  
 hard sandstones, slates, and quartzites, which may or may not  
 be unconformable to those metamorphic strata that rest  
 immediately upon the granite. Mr. DRAPER states that they  
 are unconformable. Other geologists do not admit any break  
 in the conformity, and no doubt they are so broken up and  
 intersected with igneous rocks that the recognition of the  
 exact stratigraphical relationship is not easy. In any case the  
 point is of no importance here. It is only important to  
 remember that the above series of quartzites and slates is  
 quite conformable and parallel to the overlying conglomerate  
 series which consists of sandstones, quartzites and shales,  
 interstratified amongst which are a number of beds of more or  
 less auriferous conglomerates, to which names have been given  
 —namely, the Main reef, Bird reef, Kimberley reef, and  
 Elsburg reef. No conglomerates have been found in the  
 beds underlying the conglomerate series. One of the members  
 of these underlying beds is a bed of slate containing titaniferous  
 iron and layers of jasper; this bed has a well marked indi-  
 viduality wherever known, and is called the "Hospital Hill"  
 slate. This bed of slate forms the basis of Mr. DRAPER's  
 arguments, and it is to be noted that near Johannesburg it  
 runs persistently about 6000 feet north of the Main reef  
 series of beds. According to Mr. DRAPER, the conglomerate  
 series is overlaid unconformably by the Black reef,  
 which forms the base of a series of dolomitic beds  
 parallel to the Black reef, but, of course, not to the beds of the  
 conglomerate series. The relations of the Black reef and its  
 accompanying dolomite to the conglomerate beds is, however,  
 very obscure. In the first place, they rest upon a huge sheet of  
 diabase, which, according to some geologists, is intrusive; whilst  
 according to Mr. DRAPER it is, on the contrary, an overflow bed,  
 older than the superimposed Black reef. Other geologists again  
 invoke a huge downthrow fault to account for the position of  
 these different beds, whilst our author does not recognise its  
 existence. So that with all these elements of difficulty, in the  
 absence of an authoritative survey, and with so many strong  
 motives of pecuniary interest for many people to distort know-  
 ingly or unknowingly the actual facts, it is not wonderful that  
 so many opinions at variance with each other should prevail.  
 Mr. DRAPER's views are at any rate clear on this point, and his  
 maps and sections seem to bear out his theories.

Taking, then, the succession of strata as laid down by him,  
 as being, provisionally at any rate, correct, his argument can  
 readily be followed. When a geological surveyor wishes to  
 trace the outcrops of strata, which, on account of their softness  
 or through being buried by recent formations, cannot themselves  
 be followed, his first care is to determine their relation to a  
 well-marked stratigraphical horizon. In the early days of the  
 Rand the so-called "red bar," a bed of red sandstone running  
 just north of the Main reef, was largely made use of by prospectors  
 to enable them to trace the Main reef conglomerate, which, on  
 account of its softness, was not everywhere visible at the surface.  
 Mr. DRAPER has employed this same method, which, although  
 of use in rough prospecting, is a thoroughly scientific one; it  
 need hardly be said that the mineral prospector can but rarely  
 make use of it, because it is quite exceptional that stratified  
 beds should be the object of his search; he is generally trying  
 to trace veins or reefs, which break irregularly through the  
 strata, and can, of course, not be traced by such an indicator.  
 The indicator here made use of is the "Hospital Hill" slate,  
 to which we have already referred. It has most of the characters  
 needed for these purposes; it is a hard, well-defined bed, and  
 has moderately distinctive mineralogical and petrological pecu-  
 liarities that serve to distinguish it, and these, in the utter  
 absence of fossils of any kind in any of these strata, will serve  
 well enough. Mr. DRAPER asserts, we believe correctly, that  
 there is no other bed of slate like this in the whole district,  
 and he exhibited specimens from places a good many miles to  
 the west of the known extension of the blanket beds. He  
 therefore, holds that the Main reef series ought to be found in  
 the western districts beyond Rooodepoort in the same relative  
 position as that in which it is known to occur in those portions  
 about Johannesburg that are being worked—namely, some 6000  
 feet to the south of the "Hospital Hill" slate.

Furthermore, the series of conglomerates, interbedded with  
 dark-coloured rock, known as the Bird reef, occurs in the area  
 within which the Main reef series is now being worked some  
 2500 feet south of the latter; a belt of conglomerate beds,  
 which strongly resembles and is taken by Mr. DRAPER to be iden-  
 tical with the Bird series, is traceable throughout a large portion  
 of this western area, occurring there at about the same distance  
 from the "Hospital Hill" slate, as it does near to Johannesburg.  
 This is taken by Mr. DRAPER, and fairly so, as a confirmation of  
 his theory, and he draws from this the same conclusion as to the  
 place where the Main reef ought to be found if sought for.

We have attempted to explain Mr. DRAPER's theory in as  
 untechnical language as possible, considering that we are treating



of a highly technical subject, and have endeavoured to make his arguments and conclusions intelligible to those who are not geologists; we must add that the question is greatly complicated by the violent disturbances to which these beds have been subjected owing to an excessive amount of faulting producing great horizontal displacements. One line of fault—the great Witpoortje fault—is located on the geological map appended to this paper, but if this map is correct, there must be at least a pair of faults running, one about north and south to the east of Witpoortje, and the other about north-north-east, south-south-west, through Rietvlei and Luipaard's Vlei, with a similar pair running, however, in this case north-north-east and north-north-west respectively further west. The result of these pairs of faults, whether they form trough faults, or are, so to speak, inverted troughs would be to intercalate a couple of wedges of newer or older ground, as the case might be, between the three areas through which Mr. DRAPER believes the reef to run. Indeed, his map, as it stands, gives some colour to this view, because the Kromdraai reef forms part of the boundaries of one of his areas; this reef is, as is well known, a true quartz reef—that is to say, a fissure vein, which may quite possibly occupy a portion of an extensive fault fissure, as is so often the case.

Admitting all this, however, and taking the correctness of all these statements for granted, we still note that the theory we are discussing rests on a great many assumptions. First and foremost, it takes for granted that the Main reef series will continue for an indefinite distance in an unbroken line in the same stratigraphical horizon as that which it occupies in the known gold area of the Rand. We do not for a moment intend to assert that it does not continue, and that this is only a case of "the wish being father to the thought." We cannot, however, help seeing, on a dispassionate examination of the question, that this is certainly a sheer assumption, which requires some form of proof before it can be taken as the premise on which to base such an argument as this. It is well known that the individual "reefs and leaders"—the individual thin bed of conglomerate that is—are not by any means continuous. They ramify, twist, split, splice, thin out, and disappear whilst others take their place, so that the correlation of any individual bed of the Main reef series is impossible. In fact, they behave exactly as we should expect beds of gravel to behave, that are being deposited in the bed or on the shores of a lake, the waters of which are disturbed by currents and eddies, and the streams feeding it liable to great alterations of water volume due to floods, &c.; in other words, the series—the shore of the lake—is constant through the known area, whilst the individual beds of conglomerate—the banks of gravel—vary from point to point. In the same way as the individual beds thin out it is quite possible that the entire series may, to be replaced perhaps by another series at a slightly lower or higher stratigraphical horizon, but being no longer the same reef series. Mr. DRAPER has assumed, however, that the Main reef series is quite continuous, and that it constantly occupies the same geological horizon—nay, more that the subsequent angle of upheaval has everywhere been the same, for it must not be forgotten that the horizontal distance of the Main reef series from the "Hospital Hill" slate, just as from any other inclined bed, will only remain constant as long as the angle of the dip of these deposits remains constant, even supposing that they had originally been deposited under quite uniform conditions respectively over the entire area under consideration. We accordingly find that these are the three chief assumptions upon which Mr. DRAPER's argument is based:—

1. That each reef series is continuous over very great distances.
  2. That it maintains its exact stratigraphical horizon and its general characteristics unchanged throughout the whole of this great extension.
  3. That each series has been upheaved to an inclination that is practically constant for each particular bed.
- Unless these three postulates be granted, the whole argument necessarily falls to the ground. We repeat, and we must emphasise, that we do not for a moment say that these assumptions are incorrect; what we do say is that their correctness needs proving.

Another difficulty to our mind is the following:—As far as the Main reef series of Johannesburg is known, the underlying quartzites and slates abut against a huge boss of granite. As shown in Mr. DRAPER's map, the granite continues west as far as the Kromdraai reef, where it suddenly ceases, to be replaced on the west of that line by dolomite, just as though this reef were really on the line of a fault fissure as we have suggested. Still following the map we see that this dolomite dips to the north-west, being underlain by what would seem to be the equivalent of the Black reef, which, it will be remembered, is, according to our author's view, the lowest conformable member of the dolomite series. Going south-east we cross the continuation apparently of the conglomerate series, and find on its southern edge the Black reef and the dolomite reappearing with a south-easterly dip. Unless we are to assume the existence of a very extensive and complicated series of strike faults, this can only mean one thing, bearing in mind that the Black reef and dolomite overlie the conglomerate beds; we must, namely, have to do with a huge anticlinal, a saddle of which the axis runs north-east, the dolomite series forming its north-west and south-east legs respectively, whilst the whole upper portion of the saddle has been denuded away, exposing a wide area of the conglomerate series. Now, as the Main reef series is the lowest member of this group, it is quite possible that in places it might never come to the surface, whilst in others, assuming that the "Hospital Hill" slate has been proved to exist, the Main reef may lie on the north of that bed of slate.

In fact, ingenious as Mr. DRAPER's theory undoubtedly is, and worthy of being tested by careful practical explorations, we are not quite inclined to admit that he has fully made out his case or proved his theory. Again we say we would not for a moment venture to assert that he is wrong; only he has not convinced us that he is right. At the same time, we know

very well that a geologist of Mr. DRAPER's wide experience and great ability attains in such matters a kind of acquired instinct, if we may use the phrase, that guides him far more surely than any amount of reasoning, and that he sees, almost intuitively as it were, how the stratification of a district must run with far more certainty than he can account for, and that he may often be hard put to it—nay, even unable to justify his convictions by argument, and yet turn out to be right in the end.

## PROSPEROUS INDIAN MINES.

TO those well-informed individuals who are so ready and eager to decry Indian gold mining, the monthly returns from the leading mines there must be sadly disappointing, and they are most crushing arguments with which their adversaries can reply to them. Until quite recently it was becoming the fashion to pooh-pooh and ignore mining in this insignificant (sic) quarter of the globe, for, although there was undoubtedly some gold there, it was only in patches, was not far below the surface, and in the majority of instances was too poor to work. By a strange perversion of fate, the evidence forthcoming monthly reveals a position the exact reverse of this, and greatly encourages one to look forward to a really brilliant future. We ourselves, as our readers are well aware, have always been strong advocates of Indian gold mining, even in the face of much opposition. We have been not a little blamed for this. To-day we have our reward. Our predictions have been abundantly realised, and we rest satisfied that no one has been misled by our counsel or guidance. Let us compare the returns and the prospects of most of the leading Indian mines with those situated in more fashionable quarters of the globe, and what do we find? Why, that some of the latter would rejoice greatly had they met with half the success of the former; if their present positions were half as sound; and were their prospects half as brilliant. Those few who have all along been guided by our advice, and have held on to Indians both in good and bad fortune, have now much ground for rejoicing, and can afford to enjoy a little laugh at those who would have turned their attention to less prosperous and more hopelessly struggling concerns. As a consequence of the new and sudden awakening to the potentialities of Indian gold mining, the market for these shares, even when other sections have been unusually depressed, has remained wonderfully active, and business all along has been exceedingly lively. Very seldom has a day passed by of late without the announcement that "business in Indians has still been on a very active scale, with a good rise in all classes, and a very firm tendency." Evidently all classes of the community are now as calmly assured, as formerly they were disdainfully sceptical, that there is a grand future before Mysore and the little circle which is constituted of the few principal Indian mines, and that not only are their prospects highly encouraging, but that they are capable of paying regular and substantial dividends. And yet not so very long ago such a possibility was little conceived of.

During the week the directors of the Mysore and Nundydroog Companies have issued their annual reports, and highly satisfactory and encouraging documents they are. Dealing first with the former, we are exceedingly pleased with it, as undoubtedly all the shareholders will be. Indeed, we can well imagine that they will go even further and become quite enthusiastic. The record of this company, ever since its inception, has been a brilliant and exceptional one, and certainly one to be proud of. But what is significant, and even more greatly in its favour, is that the future bids fair to eclipse the past, judging by the discoveries made from time to time at various points of the property. Dividends have been distributed during the past 10 years with wonderful regularity, the original capital has been returned to the shareholders over and over again, and now the shares stand at a considerable premium, with a margin for a further rise. Original shareholders, and those who came in at a low price, have every reason to rejoice at their good fortune, and at the further gratifying knowledge that there is something equally as, if not more substantial, awaiting them. Not many weeks ago, in an article on Gold Mining in India, we showed our readers that there were deep levels here as well as on the Rand, and this, too, in opposition to the general idea that the mines were being worked out, and that their days were consequently numbered. We also expressed an opinion that they will prove, in comparison with the surface quality of the ore, equally as rich and as profitable. All this is amply confirmed by the report before us. For instance, Crocker's Chute has been intersected at the 1060, 1160, and 1260 feet levels, and at each of them has turned out a remarkably fine body of ore, and alone assures to the mine further years of prosperity. Successful as many of the past years have been, the record for 1895 is much more brilliant. Indeed, it has been the most prosperous year in the company's history. What stands out prominently is the fact that the quality of the ore has greatly improved. The quantity crushed has shown a decrease of 303 tons, but an increase of 2151 tons in the tailings. Nevertheless the yield of gold is 17,214 ounces in excess of 1894. This is promising, and forcibly refutes the theory that the mine is becoming poorer in depth. Coming more particularly to the figures, the total gold yield was 69,728 ounces, which realised £271,624 19s. 6d. The 17,214 additional ounces accounted for an increase of £64,823 14s. 6d. The net result of the 12 months' working is the substantial profit of £140,601 19s. 6d., which exceeds the profit for the year previous by £59,170. The balance brought forward from 1894, added to the profit, made the divisible amount £141,455 3s. 3d. Out of this, two interim dividends of 2s. 6d. per share were paid in July and November, whilst on the 14th inst. a further dividend of 4s. 6d. was paid, making 9s. 6d. for the year, as against 5s. in the year previous. After writing off £4599 for depreciation, and carrying £15,000 to the sinking fund, £781 remains in hand. Now, it is well known that mining in India is expensive, and the directors have for some years had to face much opposition as to the excessive costs. Economy has been insisted upon, but the shareholders

—at least a few of them—have failed to recognise that the directors have exerted their utmost to carry out their wishes. It is a pity that the expenditure of the past year should be nearly £4819 over that of 1894. But we strongly advise shareholders not to be dissatisfied with this, nor to think that the directors have failed to act up to their promises. It was inevitable. Full explanations are given, and they should be accepted with feelings of complete satisfaction. After all, compared with the results of the year, it is a trifling amount, and is hardly worthy of a moment's consideration. Let them overlook this paragraph, and turn to the one which treats of the ore reserves. Here they will find ample comfort and consolation. The reserves—which again speak eloquently of the future—stood at the end of the year at 96,613 tons, or 20,063 tons more than at the end of 1894, without taking into account anything below the 1060 feet level on Crocker's Chute, although this has been intersected at the 1160 feet level 7 feet in width, assaying 2 ounces per ton, and at the 1260 feet 13 feet in width, at a value of 1 ounce 10 dwts. per ton. The superintendent has received instructions to keep nothing back for the future, so that the monthly returns will be more reliable than during the past few months. It is also greatly encouraging to note the success attending the cyanide process. Where the tailings are fine it is undoubtedly a success, but, unfortunately, up to the present experiments have not shown that fine crushing is the most economical way of treating the quartz. The board have this matter under their consideration, and it is to be hoped that as a result of their deliberations, a more profitable method will be discovered. Respecting the immediate prospects, should nothing unforeseen occur, the superintendent anticipates that the returns for the current year will exceed those for 1895. As a consequence of the improved position of the company, we shall anticipate an enthusiastic meeting next Tuesday.

The directors of the Nundydroog Company likewise have been able to place before their shareholders the record of a prosperous year's work. In many respects, the statement which they have published tallies in a remarkable degree with that of the Mysore Company. The profit on the year's working amounted to the respectable sum of nearly £77,140. Two interim dividends of 1s. 6d. per share were paid in July and November, and a final dividend of 2s. last week, making a total distribution for the year of 5s. per share, which compares very favourably with the 3s. paid in the preceding year. As in the case of the Mysore Company, a greater quantity of gold was produced, and there has been a gratifying improvement in the quality of the quartz crushed. The average yield was 1 ounce 2 dwts. 16 grains, as compared with 18 dwts. 23 grains during 1894, which shows an increase of 3 dwts. 17 grains per ton. This is a feature, of course, which should give the liveliest satisfaction, as it foreshadows prospects of a most encouraging kind. It is significant that both mines should show this improvement as greater depth is attained. Unlike the case of Mysore, the directors of the Nundydroog Company have been able to considerably curtail the expenditure. The total costs both in India and England have amounted to £1 16s. 11d. per ton of quartz milled, as against £2 0s. 21s., thus showing an appreciable difference of 3s. 3d. per ton. The directors have every justification for congratulating the shareholders upon the greatly improved prospects of the company. They anticipate that the result for the current year's operations will be likewise satisfactory. We hope that the remarkable success which has attended these two mines will go a long way to attract wider attention from the public, and will arouse them to the great potentialities of gold mining in this comparatively neglected quarter of the globe.

## CLOSURE OF RANTON COLLIERY.

ONE of the most significant and important events of recent years in the British coal trade has just taken place in the county of Durham. Ranton Colliery is an important colliery in this the principal coal mining county of England; it is worked by the Marquis of LONDONDEBERRY, who is not, however, the owner, but leases it from the Ecclesiastical Commissioners. Some short time ago the lease expired, and Lord LONDONDEBERRY decided not to renew it, but to close the colliery instead, as he had incurred heavy losses during the last few years of his tenancy of this pit. A petition was sent by the miners engaged in the pit to his Lordship, begging him to reconsider his decision; in reply, Lord LONDONDEBERRY took the unusual step of promising to come down to address the men personally on the subject, and in fulfilling this pledge he took the still more extraordinary step of laying his last year's balance-sheet before the men as an all-sufficient reply to their appeal. That this answer was, unfortunately, an only too complete justification of the course he was compelled to pursue does not lessen the credit due to Lord LONDONDEBERRY for his manly and straightforward conduct, which has incidentally given all of us, whether directly interested in the Ranton Pits or not, one of the most graphic pictures of the North of England coal trade which it is possible to obtain, and an object lesson that should not be passed over in silence. The pit employs between 350 and 400 men. It produced in 1895 a total of 202,993 tons of coal, of which 39,919 tons were consumed by the miners, who have free coals, and by the boilers and railways, leaving a balance of 163,074 tons to be sold. The total pay-sheet of wages for the year came to £53,033, equal to 6s. 6½d. per ton of saleable coal; materials, 1079d. per ton; horses and horse feed, 275d.; coal rents, 326d.; wayleaves, 026d.; rates and taxes 26d.; rent of ground and surface damage, 16d.; house rents for miners, 436d.; sundries, 126d.; and salaries and agents, 213d. These items can be conveniently grouped as follows:—

Wages and house rents	..	..	6	10	86
Materials and horses	..	..	1	1	54
Rents, wayleaves, taxes, surface rentals	..	..	0	7	72
Salaries, agents, and sundries	..	..	0	3	39

Cost per ton on wagons at the pit's mouth 8 11 51



The selling price of this coal at the pit's mouth was only 6s. 11½d., showing thus a loss of practically 2s. per ton, the actual loss on the year's work having been £15,640, and nothing at all being allowed for interest on capital, depreciation or other capital charges. This is a sufficiently alarming picture, though it must not be forgotten that Lord LONDONDERRY himself pointed out that the pit was an old one, and not very far from being worked out. This, of course, would mean that the men would have a long distance to go inbye to their work; that the necessity of keeping a long length of travelling ways open and in good repair means a big staff of timbermen and stonemen and other similar unproductive workers, whilst the cost of underground haulage over long distances would also represent a formidable item. After all is said and done, however, it cannot be denied that when wages make up 80 per cent. of the net cost of the coal, allowing nothing at all for the capital invested, there must be something wrong somewhere; as Lord LONDONDERRY himself pointed out, wages on the ton of coal had risen just about 50 per cent. since 1887, and no one seems to have even suggested that there is any possibility of mistake in this figure. Unfortunately, the price of coal has not risen in the same proportion, but, on the contrary, it has fallen since then. Of course, it is quite possible that, if this pit were equipped in the most modern style, with the most economical methods of haulage, and with all the most recent labour-saving appliances, it might be able to produce coal at a good deal cheaper. But what inducement is there for putting fresh capital into a concern that not only pays no interest on that already invested, but shows a heavy annual deficit?

The financial position here shown is, of course, not the normal state of affairs in Durham. Lord LONDONDERRY is working his own collieries in the same county, and, presumably, at a profit, at any rate not at a loss, and other coal owners are doing the same. Yet at Rainton, rental and way-leaves amount to very little over 1-7th part of the total loss, so that this item cannot be blamed to any very great extent for the disastrous state of affairs. On the other hand, as was pointed out at the meeting, the loss on the coal was just about equal to the hewing price, so that even if the coal were hewn for nothing, if that were possible, there would still be no interest on the capital invested. We have said that this is not a normal state of affairs, nor is Rainton a fair sample of what is going on in Durham. At the same time the coal trade is far from flourishing; the men are now only working about nine days in a fortnight, and the price is only somewhere about 5s. 6½d. per ton. This means that our production is in excess of the demand, and that things cannot go on as they are now. Meanwhile it may be noticed that the output on the Continent of mineral fuel has been increasing at an alarming rate within the last two years or so. The thought intrudes itself that we are still suffering from the reflex effects of the great 1893 strike, and that it will only take a few more like that one to ruin our coal trade altogether. *Adiit omen!*

## THE FUTURE OF RHODESIA.

DESPITE the lack of activity in the mining market, and the seeming apathy of investors towards present-day enterprise, it may safely be taken that the general public are only awaiting the disappearance of the clouds from the political horizon to embark with their accustomed energy upon new mining undertakings. South Africa and Western Australia will, of course, when confidence once again prevails, largely share their attention; but there is little doubt that Rhodesia will become a very powerful rival of the two better known goldfields. Having regard to the comparatively meagre information which we possess as to the future of Rhodesia, and notwithstanding the many literary efforts of mining experts to guide us, it is impossible to predict with anything like certainty the future of these regions, promising though they certainly are. We are all convinced, of course, that there is gold there, and that it is fairly abundant, but conclusive evidence has not yet been forthcoming as to whether it exists only in patches or in permanent reefs, workable upon a commercial scale. So far, of course, the most important work upon the condition and prospects of the industry has come from the pen of Mr. J. HAYES HAMMOND, than whom there is no greater authority upon the subject. Others have, in their own spheres, done no little towards enlightening us upon the subject, which is of such engrossing interest. Amongst these, the first name which will readily occur to the mind is that of Mr. FREDERICK G. SHAW, whose recent paper, read before the Federated Institute, we published some weeks ago. In addition to this, Mr. SHAW has contributed articles to magazines and the leading papers. One of his latest productions is an elaborate and voluminous report which he has drawn up for the benefit of the directors and shareholders of the St. Helen's Development Syndicate. Whilst, of course, purporting to give merely a description of the numerous properties held by this company, it is, nevertheless, a contribution to the general literature on the Rhodesian question, and, furthermore, goes a long way to answer the question as to the existence of gold in payable and permanent quantities. This report is undoubtedly a very valuable one, notwithstanding that it is primarily intended to circulate amongst a limited circle. It is abundantly illustrated by plans and sections, which, of course, are valuable as elucidating the matter which accompanies them. It may also be pointed out that the results embodied in the report gain additional weight from the circumstance that the operations leading up to them were conducted under the personal supervision of the author, who is thus able to vouch for their correctness. The report, undoubtedly, goes a long way to show that the prospects of the St. Helen's Development Syndicate are of the brightest. Considerations of space prevent us from quoting at all largely from the report, notwithstanding that its importance certainly entitles it to an extended treatment. We have, however, been able to place

before our readers a few extracts, giving the pith of the report, which will be found in another column.

## THE INSTITUTION OF MINING AND METALLURGY.

FOR so recently founded a society, the Institution of Mining and Metallurgy is displaying, in quite a remarkable degree, those qualities of vigorous and healthful life which ensure a full discharge of its functions in the present, and its continuation as an influential public body in the future. Not more than four or five years have passed over its collective head, and already, in addition to fulfilling the usual social and technical objects, it is producing a distinctly perceptible effect upon the direction and trend of expert mining opinion. Apart from all considerations as to the able and efficient manner in which the secretarial and establishment duties are performed, the rapidity with which its weight in the world's industrial councils has increased is referable probably to the interest infused into its inception at the commencement, and to the fact that its membership is in close touch with mining communities, situated all over the globe. Its members, for ever moving with comet-like suddenness and eccentricity from hemisphere to hemisphere, are perpetually fulfilling the part of unofficial emissaries, to spread the Institution's good name, and widen its participation in general industrial and scientific movements. The new President may be taken as an instance in point. A long and varied career as mining engineer in many parts of the world—surpassing, probably, in its scope and duration that of most men in the same profession—peculiarly befits him to discharge his important duties in connection with the Institution, and to hand down its prestige unimpaired to his successors. It will be perceived that we have published Mr. GARLAND's presidential address in full, and we think that for this our readers will be grateful. Even though it traverses very familiar ground, and although very little was told us with which we were not already familiar, it is, nevertheless, interesting and instructive, not the least of its merits being its literary excellence. It is not an address which calls for criticism, and we certainly do not intend to undertake so unnecessary and delicate a task. There is little doubt that the majority of readers will find fault with Mr. GARLAND for dealing so extensively with the conditions of mining in Cornwall, but he may be readily forgiven, inasmuch as it is the county of his birth, and it is natural that he should dwell lovingly upon it, and more so in its period of adversity. One utterance of his will meet with ready and general sympathy, wherein he spoke of the unjustifiable oppression in the exaction of dues, even when the mine is working at a loss, and the prospects are doubtful and gloomy. No one will be inclined to disagree with his statement that it will be a happy day for the country when the era of dues levied only upon profits shall have dawned. His advocacy of the Limited Liability system is also likely to meet with much support. His defence of the Cornish miner and his conservatism, which has been so persistently criticised, is not, however, likely to meet with such wide sympathy. Mr. GARLAND's efforts to show that the Cornishman is not quite so bad in this respect as he is painted will, nevertheless, be greatly appreciated in the county. His observations upon mining as a profession hit the nail on the head, and will be endorsed by all who read them, whilst his brief reference to Indian mining, of which he has a profound knowledge, is timely, and, read in conjunction with one of our to-day's leading articles, should further convince the public of the grand future awaiting the industry in this quarter of the globe.

## NOTES AND COMMENTS.

THERE is not much reason to fear that the exceptionally successful record achieved by the companies owning properties situated in the Thames district, New Zealand, will be broken by the Kapanga Gold Mining Company. The company has had its vicissitudes, having passed three times through the fire of reconstruction, but after each application of the regenerating process it has grown the stronger, until the shareholders have now every reason to rest contented both with the return made to them upon their holding, and the prices at which their shares are quoted. So far the most tangible results figuring in the company's annual statements have been obtained through the instrumentality of the two offshoot companies—the Hauraki and Blagrove's Freehold, the former of which has established something like a record in company finance by returning 200 per cent. upon its subscribed capital in 13 months. The shares in these two companies falling to the Kapanga have thus proved a solid and tangible asset, differing in this respect from the generality of cases in which shares are made to appear among a company's distributions. The dividend in shares distributed amongst the Kapanga holders is, therefore, one in reality as well as in name, and expressed in figures taken from the market quotations works out exceedingly well in the result. But, after all, it is to mining that the permanent success of the company must be due, and Captain Argall is, in this respect, able to speak very reassuringly. Boring below the 800 feet level has revealed the nature of the ground to be highly satisfactory, and the intersection in going down of a vein showing visible gold is a strong encouragement to continue until 1000 feet is reached, and even, perhaps, beyond. The interest belonging to these deep level sinkings is not confined to the Kapanga shareholders, but must be common to all persons interested in New Zealand as a permanently productive field for gold mining. That the experiences incurred in the lower levels are fraught with weighty consequences to the whole colony is shown by the readiness with which the Government have come to the company's aid, rightly giving practical expression to the view that a private industrial undertaking should not be forced to bear alone the burden of

carrying to its issue an experiment that in any case will, when finally concluded, throw a strong light upon the extent and character of the colony's mineralogical resources. The broad and far-reaching character of the interests involved in the experiment renders it doubly pleasing to know that present indications point to a successful conclusion being in the highest degree probable.

PERHAPS the most striking feature in the statement presented this week to the shareholders in the Transvaal Gold Exploration and Land Company is the clear indication afforded that the enterprise has come very well and successfully out of the recent Transvaal troubles. Under quiet but effective administration, and in the absence of any of those irritant influences prevailing elsewhere, the company has been enabled to carry on its operations peacefully and well. Nor have the board themselves neglected any reasonable precaution necessary to put the undertaking upon a firm and enduring base. In the composition and appointment of the staff regard has been paid to efficiency alone, with the result that the company has now in its service an able and experienced body of men. The Lydenburg district, in which the company possesses valuable interests, appears to be very well situated as regards facilities for working; more so, in fact, than some other well-known districts. The labour difficulty, for instance, does not press so heavily upon the mining populace here as elsewhere, greater proximity to the native sources of supply being, no doubt, in the largest degree responsible for this. Another interesting notification contained in the report is as to the period which has at length been put upon the usefulness of the mill. After long service, during which the mill has paid for itself several times over, it has at last had to be broken up, its place been supplied by recourse to the large central mill which will, in future, treat the company's ore. The Chairman was able, seeing the excellent internal organisation attained by the company, to speak in hopeful terms of its probable career, and his intimate knowledge of the company's position and prospects lends an additional weight to his view.

The directors of the Chiapas Mining Company have been able in their last annual statement to register a distinct advance upon the position occupied by the company 12 months previously. Not alone upon one point, but upon all, is the improvement clearly and definitely marked. Decreased cost, heavier returns, satisfactory development, and—most important of all—a larger profit are the chief features characterising the company's present state. The increase in profit is especially satisfactory, seeing that a lower price was obtained for the ore than during the year before. An advance in all directions such as this cogently points to a great efficiency in management, able to improve every point of advantage, and to bring the enterprise into closer touch and more perfect keeping with the ever-shifting conditions of economical working. The accounts show, moreover, that the directors are fully alive to the necessity for controlling expenditure with no niggardly hand when the company's interests demand good, serviceable plant, such as will free the company from all possible handicapping on the score of inferior working appliances. A new 10-stamp mill, water-power installation, and compressor plant for working pumps and drills are the solid results accrued upon the year's management, there being no doubt that for all practical purposes of working the company are now in a much better position than was the case at the last annual meeting. As to the mine itself, the prospects are continuously improving, so that in this regard at least the company's chances of permanent success leave little to be desired. It is true, as the shareholders pointed out, that the most satisfactory feature of all in a company's position—a good dividend—is for the present lacking, but patience is a virtue that particularly appeals to those who are engaged in mining, and there is no reason to suppose that in this case it will not meet with its due reward.

THE circular which the directors of the Murchison New Chum Gold Mines (Limited) have been obliged to issue to the shareholders reveals intelligence of a most unfortunate and depressing character. To make it all the worse it comes at a time when West Australian gold mining needs much encouragement. Of late weeks the public have not shown any animated desire to invest in West Australian securities, and they undoubtedly are awaiting until some more substantial evidence is forthcoming of the richness and permanence of the country. The news which the manager of the Murchison New Chum has been obliged to forward to the head office is not at all likely to encourage them. Rather will it tend to depress them. The news is to the effect that the present appearance of the mine is not encouraging, that practically there is no ore in sight; at any rate, no pay ore. This is very startling news, coming as it does immediately after the announcement of the February crushing, which yielded 600 ounces from 300 tons. It seems that the rich chute of ore, which has hitherto produced such good returns, has pinched out between the 240 and 320 feet levels. The manager and the directors are in hopes, however, that it will again be met with on further developments, which are progressing. That is really all the encouragement they can give to the shareholders. Unfortunately it is very, very slight.

As our readers will gather from the report published in another column, the Bunham Syndicate has been formed to work a new process for treating mixed silver, lead, and zinc sulphide ore. The momentous character of this new departure, and the vast extent of the possibilities which would be opened up by its successful working are at a glance apparent. The rich prize which would be gained by those who should successfully solve the problem here proposed has given rise to the exercise of considerable inventive ingenuity. What are practically inexhaustible supplies of sulphide ores exist in various parts of the world—in Australia and the United States notably—and the heavy pecuniary results which would follow on the application of a method of working them practicable upon a com-



mercial scale hold out, naturally enough, a high inducement to stimulate competition. Hitherto the ordinary methods for treating these ores have signally failed, and the newer processes are in some quarters condemned on the score of expense. It is claimed on behalf of the Burnham Syndicate that at last a simple and inexpensive process, requiring but little initial expenditure upon plant, and adaptable to the several conditions obtaining at the mines, has been discovered. The management and directorship of the syndicate are naturally reticent about the more technical aspects of their process, but enough has been said to show fairly conclusively that the method proposed is characterised by practical and ingenious qualities that form a respectable basis on which to found a favourable horoscope for the company's future. The score or so of sample bottles exhibited at the meeting conveyed a good deal of information to the expert mind, pointing clearly to the scope and principle underlying the new process. So high an authority as Professor Dewar has pronounced unhesitatingly as to its novelty, while the most crucial tests applied in actual working have, it is stated issued satisfactorily.

The Thistle Reef (Limited) has again been reconstructed. Shareholders in the concern are, probably, by this time too well used to the experience to exhibit an excess of emotion, even though the pistol of forfeiture be pointed at the proprietary head. Whilst it is possible to indulge the hope that, in the new form, the enterprise may be rather more successful than it has hitherto proved itself to be, it would be hazardous to form too favourable an expectation in that regard at a time when the prospects and character of the undertaking are made the subject of so sharp and embittered a controversy. Since, however, the gold mine was not purchased until June of 1893, it can hardly be said yet to have had an exhaustive trial. There are, as has been generally admitted, some good reefs in the vicinity of this particular company's property, but up to the present the directors and management have not made out a strong case for believing that there is any particularly rich ground in the company's possession. The existence at a distance—as the crow flies—of ½ mile of the eminently successful Sheba property is rather a scanty premise from which to argue inferentially forward to the value of the Thistle reef. The directors would, perhaps, be more prudent in leaving the Sheba altogether out of count, and taking note of the more modest but still substantial results that have come from mines more closely adjacent. One thing is undoubtedly strong in the company's favour. According to accounts, which have not been seriously questioned, the property is very well situated in regard to working facilities. Ample water rights for the mill are a by no means insignificant factor in a company's prospects, and, taken in conjunction with a powerful plant and abundant ore, might eventually lead to excellent results being attained from the mine. This, however, is a consummation more to be wished for than expected.

The Chairman's speech at the recent annual meeting of the Leopard's Vlei Estate and Gold Mining Company was set in a very hopeful tone, and since it is founded upon the detailed report as to the extent and capacities of the property, from the pen of Mr. Franklin White, there is no reason to suppose that the pronouncement was too optimistic, or in any way divorced from a reliable method of arguing from facts to inferences. It is well known, as he says, that gold mining in parts of the Rand, such, for instance, as the district in which the company's property is situated, is much more of an industry than a speculation, the complete knowledge gained as to the lie of the strata, and the uniformity of value characterising the ore, putting the operations upon a broader and more certain foundation than can be the case elsewhere. The nicety, moreover, with which the cost of machinery and the working charges can be calculated eliminates almost entirely all element of chance from the problem, and enables one to forecast with a close approach to certainty what the future of mining in connection with this particular property will be. Starting then from the 15 dwt. yield, which Mr. Norman takes to be a fair inference from Mr. White's report, and calculating the probable cost of machinery and the other different charges, the probable profit per annum works out at the appetising figure of £31,500. Making all due allowance for errors, it would certainly seem, in the not distant future, that there should be a satisfactory return to the shareholders upon their investment.

The Provincial Government of British Columbia has brought in a new Assessment Act, with special clauses relating to the assessment of mines. These are widely regarded in the colony as being so grossly unfair, arbitrary, and objectionable in every way that indignation meetings are being held throughout the mining districts, and resolutions are being passed calling on the Government to amend the Bill. The proposed Act begins by imposing a tax of 2 per cent. on all ore or other mineral as soon as it is raised, and before it leaves the premises of the mine. It then goes on to make very arbitrary conditions for the collection of the tax, giving the assessor power to practically take possession of the mine and all the works if he is dissatisfied with the owner's statement. The objection is not so much to the amount of the tax, but it is felt that it would be less of a hardship if it were collected in the form of an income-tax on the net returns of a mine. If the Bill passes in its present form it is thought that it will kill all the low grade properties. A similar measure was passed some time ago in Ontario. It had the effect of driving the prospectors out of the woods, and putting an end to much of the mining in that province.

Tax labour question on the Rand is apparently not diminishing in seriousness. The fact that several of the leading companies have had to cease operations altogether and shut down their properties is enough to measure the dimensions of the evil as it exists to-day, and the depression exerted as much by this as by other kindred influences of a depressing character upon the London share markets certainly emphasises the matter. According to a Reuter's communication the Transvaal Govern-

ment have awakened to the gravity of the situation—perhaps owing to its financial aspect in their regard—and are taking measures for its alleviation. This action, meditated for some time, has probably been precipitated by the representations of the local engineers, made through a responsible deputation. In the result, it is said, the Government contemplate forming a labour bureau to facilitate the introduction of native labour by affording to it efficient protection. This pronouncement by implication suggests not obscurely that hitherto the native "boys" have been unprotected, but we are not at present concerned in that matter, and can only express our satisfaction that the evils produced by lack of the necessary labour have at length been faced in a manner which gives ground for hoping that they may soon be overcome. After all, it is hardly to be wondered at that under the existing social conditions the native "boys" should view the Rand with disfavour as a place of permanent residence. Anything which could tend to make their settlement within the Republic more comfortable would act very beneficially upon the mining industry.

The preliminary operations necessary to make the West Kalguri Gold Mines productive appear from Colonel Hallett's statement at Thursday's meeting of shareholders to be proceeding apace. Greater energy in the completion of these works is probably inspired by the knowledge that a powerful reef of highly auriferous ferruginous quartz runs centrally through the two blocks constituting the company's property and which, even from the moderately-worded reports by the mining experts called in to pronounce judgment in the matter, appears to be both wide and rich. Fine particles of gold, it is said, run abundantly and evenly through the reef, which is a true fissure lode, and estimates forecast that from wall to wall its yield will prove to be from 2½ to 3 ounces per ton. There is no occasion here to point out that in the event of this prophecy being substantiated by the fact the future of the West Kalguri is assured, while the pockets of the shareholders will certainly be the heavier by continuous and satisfactory dividends. In the meantime the board's policy seems to be dictated by a shrewd grasp of the factors necessary to ensure to the company a long period of successful working. Mr. Percy Fowler is proceeding forthwith to the property, for the purpose of reporting as to its qualities and character, and of advising us to the best way of turning its resources, which have already been stated on expert authority to be so rich, to profitable account. As soon as Mr. Fowler's report comes to hand it is promised to the shareholders, who will be thus able to support the opinions already formed as to the property by the light of further information. In the meantime they may safely look forward with confidence to the future of the property.

## THE MINING MARKET.

FRIDAY EVENING.

An uneventful week—Changes in price few and unimportant.

THE past has been a most uneventful week in the Mining Market, or, for the matter of that, in every department of the Stock Exchange. Changes in price are of a trifling description, and there has been so small a business doing, and so little has occurred to warrant activity, that the story is soon told.

Business opened on Saturday with transactions of almost nominal character, but before the House closed some buying orders were reported on account of the Cape, which caused an accession of briskness. The demand, however, was restricted to two or three specialties in the Kaffir Circuit. In West Australians there was not much going on, but Indians were firm, and a small rise occurred in Broken Hills. On Monday Africans were decidedly better in tone, on the assumption that President Kruger's visit to this country would be the signal for an increase of public interest in the market. The slight gains, however, were not maintained except in two or three special cases. There was nothing doing in Westralians and New Zealanders monopolised attention in the Miscellaneous section. Tuesday's business exhausted itself in the first half hour's dealings. There were one or two marked declines in the Westralian market. New Zealand shares were irregular, whilst Indians had a sharp spurt during the afternoon. On Wednesday there was a semblance of a slight political scare on the attitude of France in relation to the Sudan question, resulting in lower prices for International stocks. The Mining Market, however, was hardly affected, all sections maintaining a masterly inactivity, with a tendency to weakness. On Thursday the political atmosphere was regarded as clearer, but there was absolutely no feature in any section of the Mining Market, and this state of things has continued to-day.

### South Africans.

The Barnato Group exhibits few changes on balance. On Saturday, there was a jump of ½ in Ginsberg carrying the price to 1½, the move being accompanied by vague rumours of something good that was to come out. The price, however, has relapsed, and the shares are finally ½ better at 1½. Marked flatness characterised Buffelsdoorn on Thursday, the loss on that day being ¼. The price is finally ¼ down at 3½. Banks at 1½, Consols at 3½, and Kimberley Roodpoort and Langlaagte Royal both at 2½, are on last week's mark, whilst declines of ¼ to ½ are shown in Johannesburg Investment and Glencairn both at 3½, Primrose at 6, Retfontains at 4½, Croesus at 1½ and Spes Bona at 1½. A determined attempt was made on Tuesday to put up Randfontains. A glaring puff in a financial daily, followed up by ostentatious biddings for shares, carried the price to 3½, but there were always plenty of sellers, and the quotation is no better to-night, a gain of ¼ thus being established. The manipulation was credited to the Robinson Bank, the shares of which are ½ up at 7½. Langlaagte are ½ better at 6, and Block B unchanged at 1½. East Rands have been fairly active, and mark a gain of ¼ at 6½, after touching 7. Comets are ½ better at 3, and St. Angolos ½ up at 4½. The allied Kleinfountains have put on ½ at 4, and Anglo-French are ½ up at 4½, the immediate cause of the improvement being the issue of a circular, in which the management protests that the closing down of the mine was in the interests of economy but only temporary, the prospects being most promising. In the meantime the crushing at the Comet

for February resulted in a yield of 1,985 ounces. There has been some disposition to pick up Deep Level shares where they could be obtained cheap. Goldenhuis Deep at 6½, Consolidated Deep at 5½, and Roodpoort Deep at 3½, are all half a point or so higher. Rand Mines were specially strong on Monday, going to 30½ on Paris buying. The price is finally a point up at 30. In the Ekstein Group the feature is the strength of Jubilee, which rose fully half a point on Tuesday, a reaction from the flatness which succeeded the passing of the dividend for the last quarter of 1895. The shares are a full point to the good at 9½. Ferreira has put on ½ at 19½, Henry Nourse ½ at 6½, Salisbury ½ at 4½, Wemmers ½ at 10, and Horiot ½ at 9. On the other hand, Modders at 10½ are ½ lower. Simmer and Jack rose to 22 on Saturday, but have since relapsed to last week's price. Wolhuter have put on ½ at 8½, and there was a spurt in the middle of the week in Transvaal Gold, which touched 6½ on satisfactory reports at the shareholders' meeting. The general list of gold shares is quite featureless, and no useful end can be served by discussing it in detail. There is not much more to be said about the Land and Exploration section. A marked falling off is shown in the activity of Chartered, which close without alteration at 4½, fluctuations having been confined between 4½ and 5. Gold Fields have improved ¼ to 13½. Gold Trusts are ½ better at 8½, and Gold Fields Deep without change at 10. A few realisations of Rhodesia Exploring have driven the price back ½ to 7½. African Estates at 2½, Bechuanaland at 1½, Exploring Land and Minerals at 1½, Hendersons at 2½, Mozambique at 1½, New Africans at 4½, and Oceana at 1½, are all where we left them a week ago. Sutherland Reefs have been offered, and close 1s. 6d. lower at 6s., and Klerksdorp are the turn easier at 14s. 9d. The small Lydenburg shares are practically unchanged. The Spitzkop February crushing of 384 ounces showed 9 dwts. to the ton. The shares are rather easier at 15s. The reported discovery of arms and ammunition in the Da Beers Mine had but a temporary effect, the shares relapsing from 28 to 27½. They are, however, unchanged on balance at 27½. Jagers have lost ¼ at 10½, and Gordons are 1s. lower at 7s. 6d.

### West Australians.

The most important information affecting this department, has been the news repeated from several quarters of excellent falls of rain. The Manzijs and White Feather groups appear to have been specially favoured in this respect, though the directors of the Great Boulder have also referred to the downfall as a satisfactory feature. Changes in quotation are of little importance, as where there has been a spurt in the earlier part of the week, reaction has followed during the last day or two so as to nullify the effect. Great Boulders are unchanged at 6½, the return of 1376 ounces having served to steady the price. Brownhill's are ½ better at 6½. Hannan's Oroya had a jump of ¼ on Tuesday, subsequently explained by the publication of a cable announcing a satisfactory discovery of ore. The shares, however, have relapsed to 1½, the odd fraction representing the net gain. Losses ranging up to ½ are shown in Central Boulders at 5, Iron King at ½, Golden Treasure and Golden Group both at 1½, Hannan's Napier at 1, Hannan's Proprietary at 1½, Hannan's Reward at 3½, and True Blue at 1½. Associated close without change at 2½, the fortnightly statement of the progress at the mines being regarded as encouraging. Menzies shares are generally lower, Reefs having lost ¼ at 1½, Gold Estates ½ at 2½, and Florence ¼ at 1½. White Feathers are unchanged at 2½, and Wealth of Nations at 1½, and Hit or Miss at 1½ each ¼ down. Golden Crowns at 1½, and Golden Plum at 1½, are each ¼ easier. Special strength has been displayed by Lady Lochs, which touched 3 to-day closing ¼ up at 2½. Mainland Consols have partially recovered from their excessive depression of last week closing ¼ higher at 2½. Hampton Plains have been in some demand, and close ½ better at 4. Big Blows have benefited by an encouraging report as to the water supply and show a gain of ¼ at ½. There have been dealings in Bass and Flinders which are slightly higher at 6s. Murchison New Chums after going better are flat at the close on an official intimation that the payable ore is exhausted. Pilbarra again are especially flat, but Mawson's Reward have put on ¼ at 5. West Australian Gold Fields have been over 7, but close the turn easier with figures at the figure. Murchison Gold Fields have given away on the offer of shares by the parent West Australian Mining Company, the shares of which are rather harder at 9s. 6d. Colonial Finance is ½ down at 4½, but other Finance Concerns are nominally unchanged.

### Miscellaneous.

Although the New Zealand group has been active, changes on balance are unimportant. Waitakauri is ½ higher at 4½, and a like gain is shown in Consolidated Goldfields of New Zealand at 2½. Hauraki at 17s. 3d. are the turn better, whilst Waihi are unchanged at 6½. The Nundydroog and Mysore annual reports were both highly encouraging, but their good effect had been thoroughly discounted in the rise which had been in progress since the turn of the year. The shares are unchanged at 5½ and 2½ respectively, whilst Champion Reefs at 6½, and Ooregum at 3½, are ¼ down. Very satisfactory crushing returns from the Brilliant Block and Brilliant and St. George Mines have assisted in keeping the Charters Towers group firm. In Copper shares Tintos have put on ¼ at 18½, whilst Anaconda has relapsed ¼ to 6½. Broken Hills are unchanged at 2½, but a special demand has sprung up for British which touched 17s. 6d. on Tuesday, and close 3s. up on balance at 17s., the rise being accompanied by rumours of a dividend. Wentworths are the turn better at 1½, a return having been published giving 2280 ounces as the result of five weeks working with an estimated value of £8360. Aladdins are unchanged at 1½. Golden Feathers are slightly harder at 13s. 6d., and Montanas have improved to 9s. 3d.

### STOCK EXCHANGE SETTLING DAYS.

#### CONSOLS.

Wednesday, April 1.

#### MINING MAKING-UP DAYS:

Tuesday, March 24 | Saturday, April 11

#### MINING NAME DAYS:

Wednesday, March 25 | Monday, April 13

#### ACCOUNT DAYS:

Friday, March 27 | Wednesday, April 15

We understand that Mr. Joseph Garland, F.G.S., M.E., left London yesterday on behalf of Messrs. John Taylor and Sons to inspect properties in Western Australia.

The directors of the Brownhill Proprietary Gold Mines (Limited) have appointed Mr. Robert Raymond as general manager of the company's property. Mr. Raymond commenced his duties on the 12th inst.



# "THE MINING JOURNAL" SHARE LIST.

ABBREVIATIONS AND REFERENCES.—The following are the significations of the abbreviations and references which occur in the Share List:—A, Antimony; Ar, Arsenic; B, Blende; Br, Borax; C, Copper; D, Diamond; G, Gold; I, Iron; L, Lead; M, Manganese; N, Nitrates; P, Phosphates; Q, Quicksilver; R, Ruby; S, Silver; S-I, Silver-lead; Sd, Sulphur; T, Tin; and Z, Zinc. \* In the "Amount of Share" column of British Mines signifies that the mine is conducted on "Cost Book" principles; † in the "Head Office" column of African Mines signifies that the address given is not that of the head office, but of a sub, or transfer office; and ‡, following

\* The following is by far the most complete and comprehensive list of mines, in whose shares business is being currently transacted, published. Additions will be made from time to time as occasion requires. Every effort is made to ensure accuracy, and Secretaries of Companies, Share Dealers, and our readers generally, are cordially invited to co-operate with us to this end, by notifying us of any errors that may at any time occur. We desire it to be understood that, while our Share List will almost invariably be found correct, we do not hold ourselves responsible for any loss or inconvenience that may arise from possible inaccuracies.

## AFRICAN MINES.

Name.	Closing Price, Mar. 20, 1896.	Closing Price, Mar. 13, 1896.	Amt. of Share	When last X'd and Dividend.	Called up Per Share.	Amount of Stock or No. of Shares Issued.	Situation of Mine.	Head Office.
Abbott's Con. Reefs	3 3/4	3 3/4	1	—	—	—	De Kaap	Broad Street Avenue.
Alders Consolidated	1 1/2	1 1/2	1	—	—	250,000	—	1, Moorgate place.
African Estates	2 1/2	2 1/2	1	2/4 rts Oct. 1895	—	438,600	3, Copthall-buildings	23, College Hill.
Gold Revy.	1 1/2	1 1/2	1	—	—	175,000	—	34, Clement's lane
Africana	1 1/2	1 1/2	1	—	—	1,075,000	Transvaal.	13, College Hill
Alexander	1 1/2	1 1/2	1	—	—	40,000	—	16, George street
Alexandra Estate	1 1/2	1 1/2	1	—	—	225,000	3, Princes street	Winchester House.
Anglo-French Exp.	4 1/2	4 1/2	1	15% Aug. 29 '95	—	30,300	Matabeleland	Dashwood House.
Matabeleland	2 1/2	2 1/2	1	—	—	39,750	—	8, Old Jewry.
Appantoo	1 1/2	1 1/2	1	—	—	77,885	West Coast	—
Aurora	1 1/2	1 1/2	1	—	—	65,000	Rand	—
West United.	1 1/2	1 1/2	1	—	—	100,000	—	—
Austral-African	1 1/2	1 1/2	1	3/- Dec. 1895	—	287,000	—	—
Balks Ferreling	3 1/2	3 1/2	1	—	—	520,000	Transvaal	85, Gracechurch-st.
Banica Consol.	6 1/2	6 1/2	1	1/ Feb. 13 '96	—	520,000	—	15, Geo. st., Mn Ho.
Barnato Bank	1 1/2	1 1/2	1	—	—	2,285,000	—	7, Louthbury
Consol.	1 1/2	1 1/2	1	—	—	1,000,000	—	—
Barrett	1 1/2	1 1/2	1	—	—	407,496	De Kaap	17, Basinghall-street
Bechuana Land Exp.	1 1/2	1 1/2	1	—	—	400,000	Bechuana.	17, St. Swithin's-lane
Trad g Assoc.	1 1/2	1 1/2	1	5 pce Jan. 1896	—	100,000	—	72, Basinghall street
Ben Frovato	1 1/2	1 1/2	1	—	—	—	—	2, Austin Friars.
Big Golden Quarry	1 1/2	1 1/2	1	—	—	483,728	Esap Mirr	Warford Court.
Block "B" Lang.	1 1/2	1 1/2	1	—	—	538,000	Rand	3, Princes-st. E.C.I.
Bonanza	1 1/2	1 1/2	1	—	—	2,000	Turffont	120, Bishopgate-st.
Brit. S. A. Char.	4 1/2	4 1/2	1	—	—	1,999,750	3, Africa	15, St. Swithin's-lane
Buffelsdoorn	3 1/2	3 1/2	1	—	—	250,000	Potchefst	7, Louthbury
Central	1 1/2	1 1/2	1	—	—	—	—	8, Old Jewry
Consolidated	1 1/2	1 1/2	1	—	—	225,000	—	Warford Court
Cape Asbestos	3 1/2	3 1/2	1	—	—	50,311	Orange Rv	19, St. Swithin's-lane
Copper	2 1/2	2 1/2	1	—	—	400,000	Cape Col.	9, Queen-street-place.
6% Pref.	2 1/2	2 1/2	1	—	—	45,000	—	39, Cannon-street.
Cassell Coal	1 1/2	1 1/2	1	—	—	75,000	Janaburg.	Palmerston Bldgs
Can. de Kaap	1 1/2	1 1/2	1	—	—	—	De Kaap	126, Bishopgate st.
Roodep's Deep	2 1/2	2 1/2	1	—	—	240,000	—	8, Old Jewry, E.C.
Champ d'Or	2 1/2	2 1/2	1	—	—	116,016	Rand	Winchester Ho.
Charterland G.F.	1 1/2	1 1/2	1	—	—	150,000	—	85, Lombard-st.
Chimes West	1 1/2	1 1/2	1	—	—	150,000	Rand	30, St. Swithin's-lane
City and Sub. N.W.G.	1 1/2	1 1/2	1	—	—	340,000	—	8, Old Jewry.
Con. Deep Levels	1 1/2	1 1/2	1	—	—	721,550	Transvaal	—
Con. G. Fields S.A.	1 1/2	1 1/2	1	—	—	187,500	3, Africa	—
Do. 5% Pref.	4 1/2	4 1/2	1	—	—	1,273,959	—	—
Do. 5% Deben.	1 1/2	1 1/2	1	—	—	500,000	Rand	—
Crown Deep	10 1/2	10 1/2	1	—	—	250,000	—	—
De Beers Consol.	27 1/2	27 1/2	1	—	—	789,791	Kimberly	62, Lombard-street.
Do. 5% 1st Deb.	10 1/2	10 1/2	1	—	—	43,500,000	—	—
Do. 5% 2nd Deb.	10 1/2	10 1/2	1	—	—	720,000	—	—
Doornkop	6 1/2	6 1/2	1	—	—	250,000	Doornkop	Warford Court
Driefontein	2 1/2	2 1/2	1	—	—	175,000	—	Winchester Ho.
Durban Roodep.	6 1/2	6 1/2	1	—	—	412,000	Rand	28, Leadenhall-bldg
Deep	4 1/2	4 1/2	1	—	—	—	—	—
Eastleigh	1 1/2	1 1/2	1	—	—	240,000	Klerkadrp	52, Leadenhall Street
East Orion	1 1/2	1 1/2	1	—	—	275,000	Rand	8, Old Jewry.
Hand	1 1/2	1 1/2	1	—	—	570,000	—	170, Winchester-ho.
Evelyn	1 1/2	1 1/2	1	—	—	66,000	—	—
Exploration	3 1/2	3 1/2	1	—	—	148,000	3, Africa	28, Old Jewry, E.C.
Exploring L.M.	1 1/2	1 1/2	1	—	—	219,215	—	30, St. Swithin's-lane
Ferreira	19 1/2	19 1/2	1	—	—	45,000	Rand	120, Bishopgate st. Wn
Forbes Reef (N.W.)	3 1/2	3 1/2	1	—	—	105,000	De Kaap	45-4, Leadenhall-st.
Goldenbuis Deep	6 1/2	6 1/2	1	—	—	265,000	Transvaal	30, St. Swithin's-lane
Goldenbuis Est. G	4 1/2	4 1/2	1	—	—	187,500	Rand	120, Bishopgate st. Wn
Main Reef	1 1/2	1 1/2	1	—	—	150,000	—	Warford Court, E.C.
George Goch	1 1/2	1 1/2	1	—	—	100,000	Johannesburg.	Warford Court, E.C.
Ginsberg New	1 1/2	1 1/2	1	—	—	130,000	Driefont	2, Draegers-gardens.
Glencairn	1 1/2	1 1/2	1	—	—	200,000	Rand	—
Gld. Fls. Deep	9 1/2	9 1/2	1	—	—	600,000	3, Africa	8, Old Jewry.
G.F. of Lydenburg	2 1/2	2 1/2	1	—	—	200,000	Lydenburg	7, Louthbury.
G.F. of Mashonaland	3 1/2	3 1/2	1	—	—	400,000	Mashonaland	19, St. Swithin's-lane
Graskop	5 1/2	5 1/2	1	—	—	105,700	Lydenburg	2, Tokenhouse Bldg
Griqualand W.	5 1/2	5 1/2	1	—	—	—	Transvaal	62, Lombard-street
Heidelberg	1 1/2	1 1/2	1	—	—	500,000	Heidelberg	32, St. St. Helen's.
Gold	2 1/2	2 1/2	1	—	—	250,000	Zoutpau	85, Gracechurch-st.
Henderson's Trans	6 1/2	6 1/2	1	—	—	100,000	—	Warford-court.
Henry Nourse	1 1/2	1 1/2	1	—	—	110,000	Middlevel.	55, Bishopgate st Wn
Hetty	1 1/2	1 1/2	1	—	—	—	—	—
Joe's Reef	3 1/2	3 1/2	1	—	—	57,404	—	21, Mining Lane.
Johannesburg Pioneer	3 1/2	3 1/2	1	—	—	650,000	—	7, Louthbury.
Jubilee	9 1/2	9 1/2	1	—	—	21,000	Hand	Johannesburg.
Jumpers	6 1/2	6 1/2	1	—	—	100,000	—	8, Old Jewry.
Deep	3 1/2	3 1/2	1	—	—	300,000	—	120, Bishopgate st. Wn
Kimberley	3 1/2	3 1/2	1	—	—	98,672	Kimberley	30, St. Swithin's-lane
Rdp.	2 1/2	2 1/2	1	—	—	125,000	—	19, Finsbury circus.
Klerkadrp	14 1/2	14 1/2	1	—	—	400,000	Klerkadrp	2, Draegers-gardens.
Knight's Deep	2 1/2	2 1/2	1	—	—	295,194	—	110, Cannon St.
Kroonfontein	1 1/2	1 1/2	1	—	—	125,000	Jacobson	8, Old Jewry
Lancaster	1 1/2	1 1/2	1	—	—	226,500	Limp. Viei	6, St. Helen's.
Langlaagte Est. G	5 1/2	5 1/2	1	—	—	470,000	Rand	120, Bishopgate st. Wn
Royal	2 1/2	2 1/2	1	—	—	100,000	—	59, Holborn Viaduct
Star	2 1/2	2 1/2	1	—	—	170,000	—	2, Draegers-gardens.
Liston-Berlyn	7 1/2	7 1/2	1	—	—	333,233	Lydenburg	Suffolk House.
Lon. Paris Fin & M.	1 1/2	1 1/2	1	—	—	500,000	—	52, Old Broad Street.
London & S. A. Ex.	14 1/2	14 1/2	1	—	—	100,000	3, Africa	19, Finsbury-circus.
Limp. Viei Est.	1 1/2	1 1/2	1	—	—	319,033	Rand	Warford-court-J
Lydenburg Estate	1 1/2	1 1/2	1	—	—	190,000	Lydenburg	85, Gracechurch Street
Ld & Expt	5 1/2	5 1/2	1	—	—	200,000	—	120, Bishopgate St.
M.G. Est.	5 1/2	5 1/2	1	—	—	300,000	—	—
Main Reef (New)	1 1/2	1 1/2	1	—	—	111,503	Hand	15, George St., Mn Ho
Malmesbury Gold	2 1/2	2 1/2	1	—	—	60,000	Transvaal	Thurston House.
Mario Louise	2 1/2	2 1/2	1	—	—	250,000	Hand	15, George St., Mn Ho
Marlevalle Nigel	1 1/2	1 1/2	1	—	—	250,000	Mashonaland	8, Old Jewry, E.C.
Mashon. Agency	2 1/2	2 1/2	1	—	—	160,000	—	—
Central	1 1/2	1 1/2	1	—	—	—	—	—
Matabele's G. R.I	4 1/2	4 1/2	1	—	—	110,000	Matabele's	3, Copthall-buildings
May Con. (New)	3 1/2	3 1/2	1	—	—	235,500	Hand	4, Louthbury.
Meyer & Charl.	5 1/2	5 1/2	1	—	—	75,000	—	1, Crosby Square.
Minerva	1 1/2	1 1/2	1	—	—	150,000	—	Winchester House.
Mine Selection	2 1/2	2 1/2	1	—	—	100,000	—	23, Br'd St. Avenue.
Modderfontein	1 1/2	1 1/2	1	—	—	200,000	Rand	13, George Street
"B" Extensn.	2 1/2	2 1/2	1	—	—	220,000	Modderfont	120, Austin Friars
Molynse Consol.	1 1/2	1 1/2	1	—	—	—	—	120, Bishopgate st
Moodies	3 1/2	3 1/2	1	—	—	240,000	3, Africa	Gresham House.
Mozambique	1 1/2	1 1/2	1	—	—	400,000	—	13, Austin Friars.
Namaqua	1 1/2	1 1/2	1	—	—	94,351	Namaqua	24, Leadenhall-bld.
New African	4 1/2	4 1/2	1	—	—	100,000	—	85, Hatton Garden.
Chimes	2 1/2	2 1/2	1	—	—	100,000	Hand	8, Old Jewry, E.C.
Claver Estate	2 1/2	2 1/2	1	—	—	100,000	Lydenburg	120, Bishopgate st. Wn
Comet	2 1/2	2 1/2	1	—	—	175,000	Heidelberg	120, Bishopgate-house.
Crown	1 1/2	1 1/2	1	—	—	404,344	Langlaagte	120, Bishopgate st. Wn
Gordon	2 1/2	2 1/2	1	—	—	88,750	Grigalund	110, Cannon-street.
Heriot	2 1/2	2 1/2	1	—	—	100,000	Hand	86, Gresham Ho E.C.
Jagersfont.	3 1/2	3 1/2	1	—	—	81,500	Transvaal	3, Copthall-buildings
Kleinfontein	3 1/2	3 1/2	1	—	—	150,000	Winchester House	120, Bishopgate-st. W
Midas	4 1/2	4 1/2	1	—	—	275,750	Mid's Viei	120, Bishopgate-st. W
Primrose	3 1/2	3 1/2	1	—	—	100,000	—	Draper's-gardens.
Rietfontein	4 1/2	4 1/2	1	—	—	100,000	—	Warford-court, E.C.
S. Augustine	1 1/2	1 1/2	1	—	—	119,6	Grigalund	30-1, St. Swithin's-lane
Pipes Bone	1 1/2	1 1/2	1	—	—	121,701	Hand	24, N. John-st., L.P.
Slaya Estate	1 1/2	1 1/2	1	—	—	125,000	Heidelberg	19, Bury Street, E.C.

## AFRICAN MINES—(Continued).

Name.	Closing Price, Mar. 20, 1896.	Closing Price, Mar. 13 1896.	Amt. of Share	When last XD and Dividend.	Called up Per Share.	Amount of Stock orNo. of Shares Issued.	Situation of Mine.	Head Office.
Nigel..... G	4 3/4	4 1/4	1 0	rts Aug 10 '95	1 0 0	160,000	Rand.....	86, Gresham Ho.
„ Deep.....G	2 1/2	2 1/2	1 0	—	1 0 0	195,000	Heidelberg	8 Old Jewry.
North Randfontein	1 3/4	1 1/4	1 0	—	1 0 0	235,000	—	8, Princes street
Nourse Deep.....	4 1/2	4 1/4	1 0	—	1 0 0	375,000	Hand.....	120, Bishopgate-st., Wn
Oceana	1 3/4	1 1/2	1 0	2/- Nov. 28 '95	1 0 0	357,400	Wirb Lyg	13, Austin Friars.
„ Development	2 1/2	2 1/2	1 0	—	1 0 0	50,000	Heidelberg	—
„ Minerals	1 1/2	1 1/2	1 0	—	1 0 0	5,000	„	—
Orange F.S.E.....D	3 1/2	3 1/2	1 0	10 1/2 Aug., '95	1 0 0	284,000	Orange F.S.	10, Moorgate-street
Orion (New).....G	2 1/2	2 1/2	1 0	10 1/2 Aug., '95	1 0 0	30,000	Rand.....	8, Old Jewry.
Paarl Central ... G	1 3/4	1 3/4	1 0	—	1 0 0	138,750	Transvaal	120, Bishopgate st. Wn
Pardy's Mozambq.	1 1/2	1 1/2	10/	rts Mar 12 '96	0 10 0	13,000	S.E. Africa	Broad St. Avenue.
Piggs Peak ..... G	3 1/2	3 1/2	1 0	—	0 17 0	200,000	Swaziland.	5, Queen-street-place
Porgera Randfontn.	2 1/2	2 1/2	1 0	2/ Feb. 13 '96	1 0 0	457,503	Rand.....	1, Bank Buildings
Potchefstroom.....G	3 1/2	3 1/2	1 0	—	1 0 0	389,750	Potchefstam	19, Bury-st., E.C.
Princess Estate G	2 1/2	2 1/2	1 0	—	1 0 0	125,000	„	33, Cornhill, E.C.
Rand Central Ore Randfontein.....G	2 1/2	2 1/2	1 0	25 p.c Aug. '95	1 0 0	115,000	—	8, Princes-street, E.C.
Rand Mines.....G	2 1/2	2 1/2	1 0	—	1 0 0	2,000,000	Rand.....	1, Bank Buildings
Rand-Rhodesia Ex	1 3/4	1 3/4	1 0	10 p.c. Oct., '95	1 0 0	332,750	„	120, Bishopgate st. Wn
Rhodesia Ex & Dv. Robinson(SA)Bank	7 1/2	7 1/2	1 0	—	1 0 0	25,000	R&Rhodesia	123,
„ Deep.....	7 1/2	7 1/2	1 0	—	1 0 0	50,000	Mt & Mash' l	8, Old Jewry.
„ Diamond	5 1/2	5 1/2	1 0	—	4 0 0	750,000	„	8, Prince's-street
„ Gold.....	1 1/2	1 1/2	1 0	—	1 0 0	500,000	N'W'Rand	13, Bishopgate st.
„ Randfont.	9 1/2	9 1/2	5 0	8/ Feb 13 '96	5 0 0	350,000	Kasi Valley	8, Prince's street
Rodepoort Deep	3 1/2	3 1/2	1 0	—	1 0 0	550,000	M. H. Rand	24, Austin Friars, Wn
Rodepoort Un. G	5 1/2	5 1/2	1 0	—	1 0 0	517,000	Rand.....	8, Prince's-street.
Rose Deep.....	5 1/2	5 1/2	1 0	5/ Feb 13 '96	1 0 0	170,000	„	8, Old Jewry, E.C.
Rothery block.....	8 1/2	8 1/2	1 0	—	1 0 0	130,000	M. H. Rand	Warnford-court, Wn
St. Angelo	4 1/2	4 1/2	1 0	—	1 0 0	300,000	„	30-31, S. Swift's st.
Salsbury New	4 1/2	4 1/2	1 0	—	1 0 0	35, Bishopgate st. Wn	„	35, Bishopgate st. Wn
Sheba.....G	2 1/2	2 1/2	1 0	—	1 0 0	175,000	Winchester House	15, Gresham Ho., E.C.
Silati	5 6	5 6	1 0	1/- Sep 28 '94	1 0 0	99,000	Rand.....	18, S. Helen's place
Simmer & Jack.....G	5 6	5 6	1 0	2/ Aug 14 '95	0 18 6	850,000	Lydenburg	85, Gracchus-burg
S.A. GoldTrustNew	8 1/2	8 1/2	1 0	15/ Feb 27 '96	1 0 0	119,000	Zoutpaan'bg	85, Gracchus-burg
South West Rand	3 1/2	3 1/2	1 0	—	1 0 0	250,000	Rand.....	8, Old Jewry.
Spitzkop (New) G	14/6	15/6	1 0	—	1 0 0	250,000	S. Africa	—
Stanhope	13/6	14/6	1 0	—	1 0 0	158,000	Rand	Winchester House
Sutherland R., G	6/ 7	6/ 7	1 0	2/- Oct 20 '95	1 0 0	99,070	Lydenburg	15, Bishopgate-st. Wn
Tati Concessions	2 1/2	2 1/2	1 0	—	1 0 0	34,800	Rand.....	95, Gresham Ho., E.C.
Trans. Coal Trust.....	13/ 1	13/ 1	1 0	—	1 0 0	220,000	Zoutpaan'bg	Dashwood Ho.
„ Consolidatd	2 1/2	2 1/2	1 0	rts Jy, 22 '95	1 0 0	392,000	—	Gresham House
„ Est. & Dev.	1 1/2	1 1/2	1 0	1/- Apr. '96	1 0 0	439,965	Rand.....	Broad-1, House E.C.
„ Gen. Assoc.	2 1/2	2 1/2	1 0	—	1 0 0	485,131	Transvaal	120, Bishopgate-st. Wn
„ Gold Exp.G	5 1/2	5 1/2	1 0	0/- Mar. 11 '96	1 0 0	185,000	Transvaal	10, New Broad-st. E.C.
„ Gold Fields	3 1/2	3 1/2	1 0	3/6 Jan. 18 '96	1 0 0	260,000	Transvaal	30, S. Swithin's-lane
„ Land.....	3 1/2	3 1/2	1 0	—	1 0 0	135,000	S. A. R.	120, Bishopgate-st. Wn
Treasury.....G	3 1/2	3 1/2	1 0	—	1 0 0	79,313	Transvaal	30, Cornhill.
Un. Exploratn.	1 1/2	1 1/2	1 0	12 1/2 Sep '91	1 0 0	138,000	„	Warnford Court
U. Ivy Reef.....G	3 1/2	3 1/2	1 0	—	1 0 0	25,070	Rand.....	12, Bishopgate St.
U. Langlaagte(N)G	1 1/2	1 1/2	1 0	2 1/2 Jan. '91	1 0 0	45,000	Transvaal	110, Cannon-street.
„ Pioneer.....	3 1/2	3 1/2	1 0	—	1 0 0	146,000	Rand.....	85, Gresham Ho., E.C.
„ Rhodsa. G.F	1 1/2	1 1/2	1 0	—	1 0 0	75,000	De Kaap	16, S. Helen's-pl.
Van Byn	5 1/2	5 1/2	1 0	—	0 10 0	245,500	Rhodesia	13, G-orge street, E.C.
„ North	5 1/2	5 1/2	1 0	4/- Jan. 16 '96	1 0 0	180,000	Rand.....	18, St. Swithin's-lane
„ West.....	3 1/2	3 1/2	1 0	—	1 0 0	116,031	„	—
Venterkroon	1 1/2	1 1/2	1 0	—	1 0 0	120,000	Rand.....	—
Vesta	1 1/2	1 1/2	1 0	—	1 0 0	125,000	Rooderand	8, Old Jewry
Village Main Reef	7 1/2	7 1/2	1 0	—	1 0 0	130,030	Rand	Winchester House
Vogelstruis Estate	3 1/2	3 1/2	1 0	—	1 0 0	177,000	„	8, Old Jewry.
„ Cons. Deep	3 1/2	3 1/2	1 0	—	1 0 0	200,000	„	Winchester House.
Wassau.....G	2 1/2	2 1/2	1 0	—	1 0 0	327,740	„	16, Geo. St. M. H. B.
Wemmer.....G	9 1/2	9 1/2	1 0	—	1 0 0	190,000	Gold Coast	147, Cannon-street
Western Nigel.....	3 1/2	3 1/2	1 0	21 Feb 13 '96	1 0 0	55,000	Rand.....	19, Bury-street, Wn
West Rand.....G	1 1/2	1 1/2	1 0	—	1 0 0	207,000	Main Reef	Suffolk House
Willoughby's Con.	2 1/2	2 1/2	1 0	—	1 0 0	240,000	Rand.....	13, Geo. St. Man. H.
Witwatersrand G	6 1/2	6 1/2	1 0	—	1 0 0	700,000	Mashonaland	3, Cophthal-bldg.
Woluhuter.....G	8 1/2	8 1/2	1 0	rts Apr 26 '96	1 0 0	250,000	Rand.....	19, Bury-st., E.C.
Worcester.....G	4 1/2	4 1/2	1 0	2/- Mar 22 '96	1 0 0	130,000	„	Warnford-court, Wn
Zambesia Explora.	2 1/2	2 1/2	1 0	—	1 0 0	90,727	Rand.....	8, Old Jewry.
	2 1/2	2 1/2	1 0	—	1 0 0	65,000	Fransvaal	30-31, Clement's-lane



AUSTRALIAN AND NEW ZEALAND MINES—(Continued).

NORTH AMERICAN MINES.SOUTH AND CENTRAL AMERICAN MINES.

## INDIAN AND ASIATIC MINES.

Balaghat Mysore	G	3/-	3/6	3/3	3/3	1	0	—	0 19 c	159,945	India ...	6-7, Queen-street-p
Churma Ruby	N	8	7½	8	7½	1	0	—	0 18 c	298,551	Burmah...	Suffolk House E C
Champion Reef...	G	6½	7	6½	7	1	0	2/- Jan. 16 '96	1 00	220,000	India .....	6-7, Queen-street-p
Color Central ...	G	1½	1/6	1/-	1/6	1	0	—	1 00	200,000	"	Dashwood Hl., E.O.
Coromandel ...	G	15½	1½	1½	15½	1	0	—	0 17 8	95,000	"	6-7, Queen-st. place
GoldFideMysore	G	21/6	22/6	22/	23/	1	0	2/- Feb '96	1 00	275,000	"	6-7, Queen-street pl
Kadur Mysore	G	3	3	3	3	5	0	—	0 50	430,000	"	Cophali House, E.C
Kompinkote Gold	F	6	1/6	5/6	1/	5	0	—	1 30	750,000	India .....	6-7, Queen-st. place
Mys. Harnhalli ...	G	5½	5½	5½	5½	1	0	4/6 Mar. 12 '96	1 00	248,354	"	6-7, Queen-street pl
" Reefs ...	G	1/	1/6	1/-	1/6	1	0	—	0 120	100,007	"	2, East India Avenue
" West(N)G	G	8	7/-	8/-	8/-	1	0	—	1 00	165,000	"	6-7, Queen-street-pl
" Wynad G	G	14½	15½	15½	15½	1	0	rtg. Jan. 16 '96	0 19 c	127,400	"	1, Gt. Winchester St.
" Reefs ...	G	2/3	3/3	2/3	3/3	10/	0	—	0 190	250,000	"	6-7, Queen-street-pl
Rundvdroog...	G	2½	2½	2½	2½	1	0	2/- Mar 12 '96	1 00	200,000	"	"
Ooregam (Dr.O.)	G	3½	3½	3½	3½	1	0	3/- Dec. 16 '95	1 00	145,000	"	"
" (102 Pref.)	G	3½	4½	3½	4½	1	0	2/- Dec. 16 '95	1 00	191,011	"	"
" (102 Pref.)	G	3½	3½	3½	3½	1	0	3/- Dec. 16 '95	0 50	12,989	"	"
Panang Kabang	G	1½	1½	1½	1½	1	0	—	1 00	360,000	Malay Fn.	4a, Jeffrey's st. E.C
Yerrakonda ...	G	8	1/6	3	3	4/	0	—	1 2 8	187,491	Mysore ...	6-7, Queen-street pl



The LIST will CLOSE on MONDAY, March 23rd, 1896, at Four p.m. for TOWN, and at Noon on the FOLLOWING DAY for the Country.  
5000 Shares were applied for before the Company was registered.  
A Development and Promoting Syndicate for a new and phenomenally rich Gold Area.  
Although a comparatively recently-discovered gold district, the output of Cripple Creek for 1895 equals \$500,000 dollars, or about one-sixth of the output of South Africa for 1895, and exceeds that of Western Australia as given in the published returns. It is essentially a poor man's district, where gold is found from the grass roots down.

## THE CRIPPLE CREEK PIONEERS

(Incorporated under the Companies' Acts, 1862 to 1890.)  
CAPITAL.....£50,000.  
Divided into 50,000 Shares of £1 each, of which 33,000 are now offered for Subscription at par, payable 2s. 6d. per Share on Application, 2s. 6d. per Share on Allotment, 5s. per Share one month after Allotment, and the balance as and when required in calls of not exceeding 5s. per Share, at intervals of not less than one month.  
50,000 of the Shares now offered are available for Working Capital.

**DIRECTORS.**  
W. P. SUTHERLAND, Director, African and Australian Gold Fields Syndicate (Limited) (Chairman).  
Capt. W. Cumberland, Director, Great Boulder Main Reef (Limited).  
Alfred Spear, Director, British Westralian Mines and Share Corporation (Limited).  
John Hamilton, Director, Hannan's Main Reef (Limited).  
Osmond L. Kendall, Fensil, Lostwithiel, Cornwall.  
(The Vendor will nominate a Director after allotment.)

**SOLICITORS.**  
London.—Hurrell and Mayo, 33, Cornhill, London, E.C.  
Manchester.—L. H. Symonds, 42, John Dalton-street.  
Colorado.—Julius Thompson, Esq., Cripple Creek, Colorado, U.S.A.

**BANKERS.**  
London.—Parr's Banking Company and Alliance Bank (Limited), Bartholomew-lane, London, E.C.  
Colorado.—El Paso County Bank, Colorado Springs, Colorado, U.S.A.

**AUDITORS.**  
Messrs E. Littlejohn, Robertson and Co., 20, Bucklersbury, E.C.  
**CONSULTING ENGINEER.**  
Chas. Haswell, Cripple Creek, Colorado, U.S.A.  
**SECRETARY AND OFFICES.**  
H. R. Hart, 117, Bishopsgate-street, London, E.C.

**ABRIDGED PROSPECTUS.**  
This Company has been formed to carry on the usual business of a Development, Promoting, and Finance Corporation, and to undertake any business commonly undertaken by Bankers, Promoters, and Concessionaires. The business of the Company will include dealing in Options, Securities, and Concessions, and will include Mining operations generally.

Its operations will be chiefly in connection with the mining industries in the recently discovered Goldfields of Cripple Creek, Colorado, U.S.A. It is, in fact, intended to be the principal parent corporation in connection with this new district, similar to the large companies so successfully operating in South Africa and Western Australia. Being a pioneer company, and almost the first English Company to turn its attention to Cripple Creek, it has an exceptionally wide scope for successful and remunerative business.

Until very recently the British public had little or no conception of the enormous wealth of the Cripple Creek Fields. Its magnitude will be appreciated from the fact that although the most important of these discoveries are of recent date, the annual output from the district during the past four years, according to statements in the "Rocky Mountain News" of January 1st, 1896, has been as under:—

1891.....	£40,000	1893.....	£500,000
1892.....	£120,000	1894.....	£800,000
1895.....	£1,620,000		

Mr. R. S. Preston, Director of the United States Mint, in speaking of gold mining, is reported by the "New York Times" to have said:—

"From facts now in my possession," said Mr. Preston, in discussing his report, "this district (Cripple Creek), altogether, will produce 15,000,000 dols. this year. It required some time to convince capitalists that this was a wonderfully rich district. The shipments of rich ore made in the last year have removed all doubt about the future of the Cripple Creek country."—(Extract from "New York Times" in "Financial News" 4th November, 1895.)

"It may seem rash to predict that the gold product of Colorado in 1895 will be doubled in 1896, but the present indications for such a result are far better than those which prevailed for the increase of the present year at the close of 1894. The work of production has only fairly commenced in the Cripple Creek district, and it will probably increase in something like a geometrical ratio for many years to come."—(Extract from "Denver's Republican," published in John Roy Marsh's pamphlet.)

Mr. W. Weston, M.E., a well-known authority on Cripple Creek, wrote as follows in the "Denver Republican" of January 1st, 1896:—

"In Cripple Creek no outside capital was used, as the mines themselves, in most cases, paid from the surface down, and furnished the capital to develop them, to acquire additional territory, and to pay dividends as well."

"Now I know that comparisons are odious. In this instance I have not made them for the purpose of decrying South African mines, but to show that while the latter have astonished the whole financial world, we have in Cripple Creek what bids fair to be a much more wonderful thing, and what is really, for its size and age, the greatest known gold field in the world to-day."

The first business of this Company will be as follows:—To take over and, if it thinks fit, deal with the undermentioned and other options on properties, some of which were obtained before the present gold fever set in, and, consequently, enables the Company to obtain the right of acquiring some of them on terms which the Directors consider much more favourable than had the options been obtained at a later date. The options comprise:—

1. The right to acquire one-fifth interest or less at par in one of the largest

development enterprises in Colorado, comprising 200 to 300 Mining Claims, in the Bar Hills district, and consisting of an amalgamation of about 3500 acres with Town sites, entire Water rights, Mill sites, and Placer sites.

2. The right to acquire a Patented Claim on Gold Hill, Cripple Creek, "Gold King" property.

3. The right to acquire a Patented Claim of 10 1/3 acres north-east of the "Queen" property.

4. The right to acquire a prop. rty comprising 5 1/2 acres adjoining the "May Queen" property.

5. The right to acquire a full claim of 10 acres on "Mineral Hill," Colorado, U.S.A.

6. The right to acquire 6 Claims near the celebrated "Victor," on Bull Hill.

7. The right to acquire 50 claims near the well-known Lincoln Mine.

The whole of the above or other options will be purchased on the terms that the Company shall be at liberty to inspect all the properties, and purchase or reject them as they may think proper.

Valuable properties are often in the hands of individuals without the means for sufficiently developing them. The Company will make a special object of acquiring such properties on favourable terms to develop them and turn them to account, also of obtaining Leases and Options on (for purchasing) approved mining claims; acting as intermediaries for the sale of the same, either in America or in Europe as may be considered advisable.

The "Denver Times," of November 27th, 1895, says:—"There are dozens of properties now selling on a basis of 50,000 dols. (£10,000), which during the next twelve months will be considered cheap at 2,000,000 dols. (£400,000)."

An idea of the success which is likely to attend a development and promoting company in Cripple Creek such as this one may be gathered from the fact that, whereas two years ago there was only one exchange in Colorado Springs and none in Cripple Creek, there are at present no less than six in these two centres. So great in fact is the interest in this locality throughout the States that exchanges have been established in Chicago, New York, and other large centres to deal in the Shares of the Mines of the Cripple Creek district. The "Anglo-American Times," December 21st, states that dealings on these exchanges in Cripple Creek mining shares amounted to 11,527,457 for the first week in December.

In fact, the United States Press devotes considerable attention to the wonderfully rich gold developments of this district. A gold fever appears to be already setting in in America in connection with the Cripple Creek Fields, and there is little doubt that in a short time the attention of the British public will be attracted to it; in all probability once the actual facts regarding it are known to the English investor they will cause more excitement than even the recent "boom" in South Africa and West Australian ventures. Applications for Shares should be sent, together with a cheque for the Application money at the rate of 2s. 6d. per Share, to the Bankers of the Company.

Prospectuses, Forms of Application, and prints of the Memorandum and Articles of Association may be obtained at the Bankers, Solicitors, and Offices of the Company.  
London March 18th, 1896.

## COMPANY FINANCE.

Reports, Balance Sheets, Dividends, &c., of Mining and other Companies.

### MYSORE GOLD MINE.

The report of the Mysore Gold Mining Company (Limited) for 1895, to be presented at the 16th ordinary general meeting to be held in London on March 24, states that the bar gold produced was 69,487 ounces, and the gross amount realised by the sale was £270,911. As compared with the returns of 1894, this is an increase in bar of 17,214 ounces, and in value of £67,824. The gross returns exceeded those of any previous year in the history of the company. The total income from gold sales and other sources was £271,625. After charging against this the whole of the revenue expenditure in India and England, together £117,613, and the royalty on gold amounting to £13,411, there is a balance of profit on the year's working of £140,601, an increase of £59,170. The balance brought forward, and the profit mentioned, make the divisible amount £141,455, and this has been dealt with as follows:—Two interim dividends, paid in July and November, of 2s. 6d. per share each, £62,235; income tax, £2828; written off for depreciation of machinery, &c., £4599; carried to sinking fund, £15,000; balance forward, £56,793. The balance enabled the directors to declare the further dividend of 4s. 6d. per share, just paid, which absorbed £56,011, and leaves £782 in hand. The total dividends distributed amongst the shareholders out of the year's profit amounted to 9s. 6d. per share, or in all £118,246, which compares with 5s. per share, or £62,235 in the previous year. The expenditure on revenue account was £4819 higher, consequently the costs per ton, including tailings, were 1s. 7d., and exclusive of tailings 1s. 4d. more. The quartz crushed amounted to 60,654 tons, which produced 58,855 ounces of gold; 38,597 tons of tailings were treated by amalgamation, producing 7180 ounces; and 18,065 tons of tailings were treated by the cyanide process, producing 3452 ounces. These figures are 6043 ounces in excess of the published monthly returns, which is accounted for by 6000 ounces additional gold having been obtained to December 31 from the quartz crushed, but not included in the returns, being a portion of the 7000 ounces referred to in the circular issued to the shareholders last month, and 43 ounces having been recovered since the end of December from the different slags collected from the cyanide works during 1895, and therefore properly belonging to the year's production. Definite instructions have been given that nothing must be kept back for the future, and that each month's actual result must be stated. The returns, as compared with those of 1894, show a decline of 303 tons in the quantity of quartz crushed, and an increase of 2151 tons in the total tailings treated. The greater quantity of gold obtained was brought about by the better yield of the ore, the quartz averaging 19 dwts. 10 grains per ton, as against 14 dwts. 12 grains, and the tailings, amalgamation and cyanide combined, producing 3 dwts. 18 grains per ton, as against 3 dwts. The sum of £22,425 was spent on capital account. The sinking fund has been increased to £85,000. The total development work executed by driving levels and crosscuts, rising and sinking, amounted to 3725 feet. The quantity of ground excavated by stoping was 4886 fathoms. The reserves at December 31 were estimated at 96,613 tons, or no less than 20,063 tons more than at the end of 1894. The whole of the machinery, plant, and buildings have been kept in good order. The directors have decided to send out a new battery of 30 stamps, not for the purpose of immediately increasing the crushing power to a corresponding extent, but to take the place of the old No. 1 mill that has been working so many years, and requires a great deal of repairs. The directors congratulate the shareholders on the highly satisfactory manner in which the mines have opened up during the period under review. As to the current year the superintendent writes:—"The outlook is certainly bright, and the prospects are decidedly good, and, unless something unforeseen occurs, the returns for 1896 should surpass those of any previous year in the history of the company."

### NUNDYDROOG.

The report of the Nundydroog Company (Limited) for 1895, to be presented at the third ordinary general meeting to be held in London on March 25, states that the produce amounted to 38,923 ounces of bar gold, including a stock of 300 ounces in hand at the mines at December 31. The amount realised by the sale of gold was £144,080, which, together with the receipts from transfer fees, rents, interest, &c., made the income on revenue account £145,219. Against this was charged the revenue expenditure in India and England, amounting to £80,930, and the royalty on gold, £7150, or a total of £88,080, therefore the profit on the working amounted to £77,139. The total disposable sum for the year, including £1063 brought forward, and the profit of £57 on the sale of Consols, was £78,259, which was dealt with in the following manner:—Two interim dividends of 1s. 6d. per share each, paid in July and November respectively, £32,900; income-tax £1569; written

off for depreciation of machinery, &c., £1542; reserve fund, £1000; additions to buildings, machinery, and plant, £12,943; unproductive work in the development of the mine and other expenditure, £4660; Mr. Edgar Taylor's mission, £125; final dividend of 2s. per share declared on February 21st, £22,000; balance in hand, £1460. The total amount declared in dividends amounted to £54,960, or 5s. per share, as compared with 3s. per share paid in 1894. The gold returns show that 32,975 tons of quartz were crushed, yielding 37,393 ounces of gold, and that 7775 tons of tailings were treated, yielding 1530 ounces. These figures compare with 29,750 tons of quartz crushed, yielding 28,200 ounces of gold; and 7625 tons of tailings treated, producing 1457 ounces of gold. The total gives an increase of 9266 ounces. The average yield per ton of quartz crushed was 1 ounce 2 dwts. 16 grains, as compared with 18 dwts. 23 grains, which shows the satisfactory increase of 3 dwts. 17 grains per ton in the grade of the ore milled. There was no material difference in the quality of the tailings. The total costs in India and England amounted to £1 16s. 11d. per ton of quartz milled, as against £2 0s. 2d., a difference of 3s. 3d. per ton. Exclusive of the amount expended on the treatment of tailings, the costs were £1 15s. 3d. per ton of quartz. At the mines the total amount of sinking, rising, and driving was 10,394 feet, besides which 1273 cubic fathoms of ground were excavated by stoping. It is a noteworthy fact that although more quartz was crushed by 3225 tons, less ore ground was stoped by 428 cubic fathoms, a much larger proportion of the ore for the mills being obtained from the exploratory workings. A large quantity of valuable ground was laid open, with the result that the estimated reserves at December 31 amounted to 51,405 tons, as compared with 43,715 tons at the end of 1894—an increase of 7630 tons. The machinery throughout the mines has been maintained in an efficient state. A new battery of 30 heads of stamps, with engine and boilers capable of operating 40 heads, has been supplied. These stamps will probably be completed ready for work by the end of the present work. When these commence crushing, one of the old batteries of 20 heads will be stopped for removal to the central position, and when these are finished a similar thing will occur to the remaining 20. But from the starting of the new stamps 50 heads may be expected to be in operation, instead of 40 as at present, and when the removal of the old mills is accomplished the full 76 heads will be available. A careful trial made at the Mysore Company's cyanide works of a 30 ton lot of this company's tailings showed that they were amenable to treatment by that process, and the directors propose to send out at once a cyanide plant equal to treating 2500 per month. Negotiations are now in progress with the Cassel Company upon the subject. The directors congratulate the shareholders upon the greatly improved prospects of the company, and anticipate that the result of the current year's operations will be in every respect satisfactory.

### MURCHISON NEW CHUM GOLD MINES.

The following circular has been issued to the shareholders:—"The present appearance of the mine is not encouraging. Practically there is no ore in sight, no pay ore. Level has at present a length of 70 feet. The ore has practically pinched out. Shall commence to rise upon the vein at once. Cannot form any reliable estimate as to the future returns." "February crushing—300 tons, 600 ounces." The board regrets having to convey this discouraging news to shareholders. The manager has been cabled to report further by mail, and cable any fresh developments, which will be duly communicated to shareholders, when received. The plans, which only arrived by this week's mail, indicate that the rich chute of ore, which has hitherto produced such good returns, was narrowing, and must have pinched out between the 240 and 320 feet levels, since it appears by the above cable that it has not yet been found at the lower level. It is to be hoped, however, that it will be again met with on further developments, which are progressing. The North Chum lease continues to produce low grade ore, but it is doubtful if it can be worked by itself at a profit, with the present limited crushing power and heavy working expenses.

### THE AFRICA TRUST (LIMITED).

In view of the more active period of development which is expected to commence shortly in the territories of the British South Africa Company, it has been decided to largely extend the operations of this company in that direction. The directors are glad to be able to report that this has been done, indirectly, without cost to the company, by securing a call at par on 57,000 shares in the Bulawayo Estate and Trust Company (Limited) for 18 months from the date of registration of that company. This new company will have a total capital of £250,000; it has absorbed the assets of the Browne-Fairbridge Syndicate (Limited), which are believed to be of great value, and will commence operations with a called-up cash working capital of £60,000, and with 166,000 shares in reserve. Out of this reserve no less than 57,000 will be under option to the Africa Trust (Limited). Two directors of the Bulawayo Estate and Trust Company (Limited)—viz., the Hon. John Scott Montagu, M.P., and Mr. W. A. Wills, one of whom is also on the board of, and is a large shareholder in, your company—have already

started for Cape Town en route to Bulawayo upon the business of the company. This transaction is regarded by the directors as one that is likely to benefit your company to a very material extent. Arrangements are in progress, under which your company hopes to obtain a large interest in a most important African Concession, from which, with ordinary good fortune, your company hopes to derive large benefits. Should this business be satisfactorily concluded, the directors trust, at an early date, to be in a position to make its provisions public.

### THE BANK OF AFRICA (LIMITED).

The following is the report of the directors to be submitted at the forthcoming meeting:—"The directors submit the report and balance-sheet for the half-year ended December 31st last. After providing for bad and doubtful debts the net profits amount to £27,265 5s.; add balance from June 30, 1895, £6617 17s. 1d.; total, £33,883 2s. 1d. This it is proposed to apply as follows:—Dividend of 6s. 3d. per share (being at the rate of 10 per cent. per annum) free of income-tax, £12,500; bonus of 1s. 3d. per share (being at the rate of 2 per cent. per annum) free of income-tax, £2500; dividend at 5 per cent. per annum upon payments received for new shares, £373 14s.; transfer to reserve fund, £10,362 10s.; contribution to pension fund, £1000; balance to next account, £7146 18s. 1d. The premium obtained upon the issue of 44,000 new shares is £127,137 10s., which, together with £10,362 10s. of the profits for the half-year, has been added to the reserve fund. This now amounts to £287,500. Branches of the bank have been opened at Klerksdorp and at Salisbury. Two of the directors, Mr. Rochfort Maguire and Mr. William Young, retire by rotation, and being eligible offer themselves for re-election. As will be seen from the notice of the meeting, a resolution will be submitted dealing with the directors' fees, which stand at £2000 per annum. It will be proposed to increase this sum to £3000 per annum.

### BARROW HEMATITE STEEL COMPANY.

The directors' report for the year ended December 31, 1895 states the very unsatisfactory condition of the iron and steel industries, referred to in the last report of the directors, prevailed during the greater part of the year. In the autumn a considerable improvement occurred in the demand for pig iron, accompanied by a substantial advance in the market price. The profits subsequently made in this department, combined with the profits of the mines and colliery, were sufficient to extinguish the loss incurred in the earlier part of the year, and to leave a small margin of profit, the result of the operations of the whole 12 months being as follows:—Profit for the year 1895, £27,815; at credit of profit and loss account at December 31, 1894, £1967, making a total of £29,782, less interest on debentures and debenture stock, leaving a balance of £1436 to be carried forward. The sum of £7005 has been expended upon extensions and improvements to the works. The sum not being chargeable to capital has been added to the suspense account. Early in the year the directors found it essential to seek substantial reductions in the rates paid for the higher classes of labour in the steel works. The claim was by arrangement referred to the decision of an arbitrator. He awarded considerable reductions in the higher-paid classes of labour, and these were honourably accepted and worked under up till June 30, when the binding operation of the award terminated. The men were then unwilling to continue to work at the reduced rates, and the company did not see its way to take orders even under such rates at the low prices then alone obtainable. Consequently, after completing a few existing orders, the steelworks were laid idle, and remained closed till nearly the end of the year, when prices, having improved, and the men having agreed to resume work at the formerly awarded rates, coupled with a sliding scale securing percentage advances in proportion to increased prices, the steelworks were again brought into operation, and are now pretty fully employed. An important reconstruction of a portion of the Bessemer plant is in progress with the object of securing greater efficiency and economy in this department. The new deposit of ore at the Park Mines referred to in the report of 1894 is yielding a fair quantity of ore of good quality. The condition of the mines at Stank and Whittrigs is not so satisfactory, but it is hoped that explorations at these mines will lead to the discovery of new deposits of ore. Only a small profit has resulted from the working of the collieries. Up to the end of 1895 holders of debentures to the extent of £174,150 had accepted debenture stock in substitution for their debentures, and debentures amounting to £174,424 had been paid off by means of monies received from subscriptions to the new stock. Further progress has been made since December 31st last in carrying out these arrangements, and the directors have no reason to doubt that the conversion of the whole of the terminable debentures into stock will be successfully accomplished. Sir Lowthian Bell and Sir James Ramsden have resigned their directorships, and Mr. W. F. Egerton, Dane Ghyll, Barrow, the Duke of Devonshire's nephew, and Mr. William A. Donaldson, of Glasgow, a large shareholder, have been appointed on the board in their stead.



## THE WEST AUSTRALIAN MINING COMPANY.

A circular to the shareholders says:—The issue of our recent report has led to a large mass of correspondence from the shareholders congratulating the directors upon the very satisfactory position of the company as therein shown, but also, in some instances, complaining of the omission of a dividend warrant accompanying the report. As there seems to be a general desire that an interim dividend should be paid, the board have decided to pay at once an interim quarterly dividend at the rate of 50 per cent. per annum to those entitled to have their names on the register of members on April 7 next. In future, however, dividends will only be payable half-yearly, in consequence of the unavoidable delay in getting complete accounts from the various properties in which the company is interested. The books of the company will be closed from the night of April 7 to 15 next for the preparation of the dividend warrants, which will be posted immediately afterwards.

At a meeting of the directors of the FORTUNA COMPANY (LIMITED), held on Thursday, it was resolved:—"That a dividend of 1s. per share, free of income tax, be declared payable on Saturday, April 11, and that the transfer books be closed for such dividend from the 30th inst. to April 11, both days inclusive."

At a meeting of the directors of the ALAMILLOS COMPANY (LIMITED), held on Thursday, it was resolved:—"That a dividend of 1s. 9d. per share, free of income-tax, be declared, payable on Saturday, April 11, and that the transfer books be closed for such dividend from the 30th inst. to April 11, both days inclusive."

On and after Monday next the offices of the following companies will be at Nos. 71 and 72, King William-street, E.C.—New Queen Gold Mining Company (Limited), Colenbunders Matabeleland Development Company (Limited), Hawks Groulley's Rhodesia Development Company (Limited), Hawks View Gold Mining Company (Limited), Mount Magnet Gold Mining Company (Limited), Bendigo District Gold Mines of Victoria (Limited), Lake View and Boulder Junction Gold Mines (Limited), Eaglehawk Consolidated Gold Mining Company (Limited).

The CENTRAL URUGUAY EXTENSION RAILWAY (LIMITED) notifies that, after providing for the debenture interest, the net revenue account to December 31 (made up of the profits of working, and the moneys received under the amended guarantee arrangement) shows a balance of £12,534 8s. 6d., out of which the board have decided to pay an interim dividend of 3s. 6d. per share, free of income-tax, on the share capital of the company (at the rate of 3½ per cent. per annum), carrying forward a balance of £284 8s. 6d.

The JOHANNESBURG CONSOLIDATED INVESTMENT COMPANY (LIMITED) announce that the transfer books of the undermentioned companies will be closed from the 1st to 11th April inclusive for the purpose of balancing the share ledgers:—Fleishold Gold Mining Company, New United Main Reef Company, New Spes Bona Gold Mining Company, Ginsberg Gold Mining Company, Consort Consolidated Mines (Limited), Barnato Consolidated Mines (Limited), Aurora West United Gold Mining Company, Balmoral Main Reef Gold Mining Company.

Letters of allotment to applicants for shares in the ANTERIOR (MATABELE) GOLD MINES (LIMITED) have been posted.

A dividend of 50 per cent. (being at the rate of 100 per cent. per annum) has been declared by the board of the CROWN REEF GOLD MINING COMPANY (LIMITED) for the half-year ending March 31, payable to shareholders registered in the books of the company at the close of business at 4 p.m. on Tuesday, March 31, and to holders of Coupon No. 4 attached to share warrants to bearer. The dividend warrants will be despatched to London from the company's head office, Johannesburg, about May 11 next. The transfer registers will be closed from April 1 to April 7, both days inclusive.

Letters of allotment to applicants for shares in the WATKINS CROSS GOLD MINING COMPANY (LIMITED) have been posted.

The directors of the AMERICAN INVESTMENT TRUST COMPANY (LIMITED) will recommend at the annual meeting on March 27 a dividend on the deferred stock at the rate of 6 per cent. per annum for the half-year ended March 15, making 5½ per cent. for the year, carrying forward £3096 4s. 10d.

The directors of the FOREIGN, AMERICAN, AND GENERAL INVESTMENTS TRUST COMPANY (LIMITED) will recommend at the annual meeting on March 27 a dividend for the half-year ended March 15 at the rate of 3½ per cent. per annum on the deferred stock, making 2½ per cent. for the year, carrying forward £2014 2s. 2d.

Subject to audit, the balance standing to credit of profit and loss account of the MASHONALAND AGENCY (LIMITED) amounts to £50,938 1s. 9d., out of which the directors recommend a dividend of 2s. per share, free of income tax, being at the rate of 10 per cent. per annum, carrying forward the sum of £20,271 5s. 5d. The premiums realised on the sale of reserved shares—i.e., £71,984 7s. 6d. have been placed to reserve. The transfer-books of the company will be closed from April 4 to April 15 inclusive.

The directors of the LINARES LEAD MINING COMPANY (LIMITED), at their meeting on Thursday, resolved:—"That a dividend of 9s. per share, free of income tax, be declared payable on Saturday, April 11, and that the transfer books be closed for such dividend from the 30th inst. to April 11, both days inclusive."

The secretary of the MYSORE-WYNAAD CONSOLIDATED GOLD MINING COMPANY (LIMITED) has sold the gold obtained in January for £2070 4s. 5d.

WARD GOLD.—Cable received:—"Driving in both directions at the 80 foot level. Drift looks well."

THE WESTERN AUSTRALIAN DEVELOPMENT CORPORATION (LIMITED).—A fair sample of ore, showing no visible gold, from the Glenloth lease, belonging to the McKenzie Gold Mines (Limited), was forwarded to Messrs. Johnson, Matthey and Co. (Limited), assayers to the Bank of England and Her Majesty's Mint, and that firm has given the undermentioned certificate of assay for the McKenzie Gold Mines (Limited): We have assayed the sample of quartz as under, and find the following to be the result: Glenloth, produce of gold 122 ounces 15 dwts. per ton of 2240 lbs. of quartz.

MR. JAMES DUBIE PATULLO has removed from 30 and 31, St. Swithin's-lane, to 71 and 72, King William-street, London, E.C.

## AFRICAN MINES' OUTPUT FOR FEBRUARY.

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
	Ozs.	Ozs.	Ozs.	Ozs.	Ozs.	Ozs.
African Gold Recovery...	64,000	61,500	65,500	—	—	—
Appantoo .....	274½	815	805	546	550	—
Barrett .....	3,594	3,606	3,418	2,690	2,548	2,621
Block B .....	3,188	2,049	2,716	4,011	3,625	2,539
Buffeddoorn .....	3,776	4,006	3,823	5,433	—	—
Champ d'Or .....	8,381	8,597	8,225	8,036	6,308	8,037
City and Suburban .....	11,385	11,100	11,448	10,729	8,890	10,845
Crown Reef .....	6,089	6,318	6,222	4,710	3,812	5,282
Durban-Roodepoort .....	1,994	2,042	2,150	1,413	1,950	1,844
Kastleigh .....	7,439	7,740	8,116	11,050	9,879	11,770
Ferreira .....	75	—	68	109	118	144
Forbes Reef .....	—	—	—	144	129	201
Graskop .....	—	—	3,698	3,190	3,382	2,793
Geldenhuis Deep .....	7,236	6,898	6,532	5,099	4,304	5,815
Geldenhuis Estate .....	2,088	1,835	1,924	2,052	1,747	1,876
Geldenhuis Main Reef .....	3,361	3,244	3,190	3,355	2,278	3,082
George Goch .....	851	857	768	679	813	910
Ginsberg .....	4,096	1,955	6,159	5,364	3,163	4,401
Glencairn Main Reef .....	4,562	4,724	4,847	5,021	3,616	5,288
Henry Nourse .....	150	230	258	205	199	155
Joe's Reef .....	2,507	2,668	2,762	—	—	—
Johannesburg Pioneer .....	2,727	2,176	2,334	2,689	2,238	2,472
Jubilee .....	6,497	6,355	5,957	4,960	3,104	3,317
Jumpers .....	318	348	314	234	265	—
Lancaster .....	11,081	11,055	10,740	9,679	9,058	9,165
Langlaagte Estate .....	640	644	692	653	808	821
Lisbon-Berlyn .....	6,032	5,604	5,738	5,299	5,048	3,237
May Consolidated .....	1,981	1,916	1,621	—	—	—
Metropolitan .....	3,642	3,359	2,885	3,964	2,437	3,008
Meyer and Charlton .....	—	—	1,695	1,139	1,300	1,313
Minerva .....	515	317	300	309	490	—
Moodies .....	2,431	2,370	2,363	1,886	807	806
New Chimes .....	—	1,473	2,223	1,381	1,573	1,683
New Clewer Estate .....	—	2,971	2,327	2,430	—	—
New Comet .....	2,851	2,766	2,734	2,175	2,020	3,058
New Croesus .....	5,998	5,803	5,735	5,326	3,825	5,716
New Heriot .....	2,631	2,608	2,519	2,552	1,326	2,808
New Kleinfontein .....	11,418	11,584	12,023	9,553	9,026	9,101
New Primrose .....	2,448	2,162	2,289	1,901	2,076	2,297
New Rietfontein .....	2,658	2,550	2,613	2,844	2,074	2,079
Nigel .....	871	1,850	2,600	2,900	2,111	2,111
Orion .....	3,083	2,330	1,932	404	—	—
Paarl Central .....	—	—	—	—	88	66
Pigg's Peak .....	3,921	3,821	2,515	2,517	1,792	1,129
Porges-Randfontein .....	2,000	2,100	2,024	1,334	1,523	—
Princess Estate .....	17,294	17,371	16,367	16,024	12,281	14,823
Robinson .....	4,691	4,823	4,719	3,625	3,337	3,820
Rodepoort United M.R. .....	3,043	3,000	2,550	2,450	2,100	1,950
Salisbury .....	5,842	6,980	6,563	6,602	10,010	10,028
Sheba .....	7,783	7,786	7,786	8,302	6,319	7,753
Simmer and Jack .....	571	823	243	199	211	—
Spitzkop .....	870	960	1,000	730	—	729
Stanhope .....	593	598	594	229	239	430
Sutherland Reef .....	3,175	2,550	2,550	2,625	2,475	2,330
Transvaal Gold .....	2,316	2,164	1,845	1,143	567	—
United Langlaagte .....	2,920	3,128	2,624	2,406	2,334	2,081
Van Ryn .....	—	—	304	—	—	—
Violet Consolidated .....	7,119	6,641	6,457	6,075	5,361	4,967
Wemmer .....	4,715	5,240	5,435	5,527	3,216	4,906
Wolhuter .....	1,829	1,922	2,031	1,971	2,050	1,850
Worcester Exploration .....	—	—	—	—	—	—

	Carats.	Carats.	Carats.	Carats.	Carats.	Carats.
	Carats.	Carats.	Carats.	Carats.	Carats.	Carats.
Koffyfontein .....	2,275	3,450	3,750	3,500	3,800	4,250
New Gordon .....	—	—	—	—	—	2,118
Un. Mines, Bultfontein .....	—	—	—	—	6,000	—

	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Cassell Coal .....	21,500	23,537	24,108	24,100	15,880	22,435
Great Eastern .....	—	—	—	—	11,400	15,400
Transvaal Coal Trust .....	28,300	31,000	32,100	23,400	24,500	29,400

The following are the profits or losses (the latter being indicated by a \*) made by South African mining companies:—

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
	£	£	£	£	£	£
City and Suburban .....	6,580	8,080	4,780	4,550	—	—
Crown Reef .....	15,125	14,367	15,213	12,192	10,510	—
Geldenhuis Estate .....	10,000	6,500	4,500	1,996	2,700*	4,400
Geldenhuis Main Reef .....	3,074	1,832	3,161	2,847	2,050	2,662
George Goch .....	4,083	2,492	3,247	—	—	—
Glencairn .....	8,009	—	10,855	7,682	2,167	5,769
Jumpers .....	10,370	9,500	7,500	4,337	2,000	2,000
May Consolidated .....	6,691	6,360	6,606	6,000	—	—
Metropolitan .....	279	—	—	—	—	—
Meyer and Charlton .....	5,950	4,271	2,138	3,708	646	2,430
New Chimes .....	2,415	2,095	2,152	—	—	—
New Clewer .....	—	—	—	—	—	—
New Heriot .....	11,418	9,350	10,031	—	—	—
New Primrose .....	14,500	14,667	16,047	6,675	5,730	6,552
New Rietfontein .....	2,610	1,818	1,832	—	—	—
Orion .....	—	—	—	—	—	—
Princess Estate .....	1,399	1,669	1,675	—	—	—
Robinson .....	39,500	39,500	34,000	35,000	19,000	25,000
Rodepoort United .....	8,300	8,320	7,850	4,100	4,000	6,000
Simmer and Jack .....	12,848	10,778	11,044	11,032	5,347	—
Transvaal Gold .....	4,095	3,125	3,045	2,915	2,910	—
Van Ryn .....	3,089	3,903	2,396	1,482	—	—
Wemmer .....	14,025	11,037	11,380	10,695	7,958	6,559

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
	£	£	£	£	£	£
Un. Mines, Bultfontein .....	—	—	—	—	2,000	—

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
	£	£	£	£	£	£
Cassell Coal .....	4,250	4,400	4,750	4,550	1,060	—
Great Eastern .....	—	—	—	—	1,300	—
Transvaal Coal Trust .....	3,300	4,300	4,600	4,500	2,000	3,600

## REPORTS FROM THE MINES.

## BRITISH MINES.

DEVON GREAT CONSOLS.—William Cleme, March 19:—Wheat Anna Maria engine shaft. In the stope in the bottom of the 124 fathom level the lode is producing 10 tons mundie per fathom. The stope in the back of the 110 fathom level east will produce 6 tons mundie and 9 tons copper ores per fathom.—Field's shaft, south lode. The stope in the bottom of the 130 fathom level west is yielding 8 tons copper ore and 4 tons mundie per fathom.—Wheat Josiah, field shaft, south lode. The stope in the back of 130 east is producing 6 tons mundie per fathom.—Richards' shaft. The stope in the back of the 130 west is yielding 10 tons mundie per fathom. Stope No. 2 in the back of the 130 fathom level west is also yielding 10 tons mundie per fathom.—Agnes' shaft. The stope in the bottom of the 103 fathom level west is producing 4 tons copper and mundie ores per fathom.—Wheat Emma, Thomas shaft. The stope in the bottom of the 100 east is yielding 9 tons mundie per fathom. The stope No. 2 in bottom of the 100 east is yielding 10 tons of mundie per fathom. The stope in the back of the 100 fathom level will produce 7 tons of mundie per fathom.

No. 2 stope in back of the 100 east will produce 6 tons mundie per fathom. No. 3 stope in back of the 100 fathom level east is also producing 6 tons of mundie per fathom.—Inclined shaft. The stope in the back of the 162 fathom level east is producing 4 tons mundie and 2 tons copper ores per fathom. No. 2 stope in the back of the 162 fathom level east is worth 6 tons mundie per fathom. The stope in the back of the 100 fathom level west will yield 3 tons mundie and 2 tons copper ores per fathom.—New shaft, new south lode. The stope in the back of the 180 fathom level east will produce 5 tons of mundie per fathom. No. 2 stope in the back of the 130 130 east is yielding 6 tons mundie and 1 ton copper ore per fathom.—Watson's engine shaft. In the 172 fathom level east the lode is 4 feet wide, producing a little copper and mundie ores. The stope in the back of the 172 fathom level east is producing 6 tons copper and mundie ores per fathom. The stope in the back of the 100 fathom level east is producing 6 tons copper and mundie ores per fathom. The stope in the bottom of the 148 fathom level west is yielding 8 tons copper and mundie ores per fathom. The weather during the past month has been remarkably favourable for this season of the year, and all our workings have continued in full operation.

WEST KITTY.—Cornwall, March 19: The rise in back of 84 fathom level west of Reynolds' shaft is worth £3 per fathom. The 72 fathom level west of Reynolds' shaft the lode shows signs of improvement, but is without value. The 60 end driving west of Reynolds' shaft the lode is 3 feet wide, and worth £3 per fathom. The rise in back of 60 fathom level the lode is worth £12 per fathom. Thomas' shaft is sunk 6 feet below the 60 fathom level. The 60 end east of Thomas' shaft is worth £9 per fathom. The stope and tribute pitches are about the same value as last reported. We shall sell 13 tons of tin next Tuesday.—(Signed) John Williams, Joel Hooper.

## COLONIAL, INDIAN, AND FOREIGN MINES.

BROKEN HILL PROPRIETARY.—Report for the week ending March 19: 6572 tons of ore were treated, yielded 491 tons of lead, containing 125,752 ounces silver; also 1105 tons treated by amalgamating and leaching plants produced 14,308 ounces silver. The price of the shares in Melbourne is £2 8s. 6d. buyers.

CONSUELLO.—The manager states that he has struck an important body of ore in the Madrid lease 2½ feet in width fall of visible gold. The width of the lode is 8 feet from wall to wall, with a general average throughout of 3 ounces per ton.

FRONTINO AND BOLIVIA.—Report for January: Estimated value of gold and sulphur, £6743 18s.; estimated cost, £5753 15s.; estimated profit, £990 3s.

NEW CASSEL COAL AND EXPLORATION.—The following is from Mr. J. W. Henwood's report, the company's agent at Middelburg, South Africa, dated February 1:—I have started your manager at Bankfontein, who has had the shaft cleaned out, and commenced getting out coal. I am only waiting transport to send you the samples. Mr. Crosby will start on the main shaft this coming week. I have already secured several orders, and trust the sales of coal will soon cover your working expenses.

NEW QUEEN.—The following fortnightly report has been received from the mine, dated Charters Towers, January 17:—No. 4 south level footwall. Stopping has been continued both over and under this level, the reef varying from 3 to 6 inches. The ground is hard, and does not shoot well.—No. 2 formation. Stopping has been carried on on both sides of the winze. On the south side the reef varies from a leader to 6 inches. On the north side the reef is very irregular, a large portion of the stope carrying no stone. Stopping has also been carried on in the level from the bottom of straight shaft, the reef averaging not more than 3 inches.—No. 4 formation. No. 3 north level. Stopping has been continued over this level, the formation is large. Work has been carried on in the footwall section of the formation. We have timbered up the hanging-wall portion, so that now we are carrying from 3 to 5 feet of formation, the reef on the footwall varying from 6 to 9 inches.—Straight shaft. The straight shaft has been sunk a further depth of 10 feet, making it 331 feet below No. 4 plat, and 1333 feet from the surface. The ground in the bottom of the shaft is harder, and is composed of a gray granite with several floors and vertical heads in the bottom. The water is still coming up from the bottom, and not diminishing in any way, it requires two men almost continually baling to keep it down.—Quantity of stuff raised during the fortnight. No. 4 south level footwall, 110 trucks; No. 2 formation, 60 trucks; No. 4 formation, 45 trucks; total, 215 trucks.

PESTARENA.—Mid-monthly report, March 16, W. Henwood Telesse:—Ends. The lode in the 33 east on No. 1 is 120 metres wide, with a branch of ore on the hanging wall estimated to produce 1 ton of 15 dwts. per fathom. The 46 east on No. 1 lode is now producing 6 tons of 2 ounces 10 dwts. ore per fathom. In stopping forward the 46 east on caunter the lode is found to be 1 metre wide, and some good stones of ore are frequently met with, but not sufficient to value. A considerable quantity of water is now issuing from the lode in the 55 end east, but is not an increase to the pumping, being that which has hitherto been drained by the 70 end east.—Crosscut. The 46 south from vertical shaft has intersected a lode which is 80 centimetres in width and carries quartz mixed with graphitic heads and a little pyrites. As soon as the end is squared, driving will be immediately commenced towards the Pozzone Mine, and will be reported as "46 east on Pozzone lode." No change of importance has occurred in either the 70 north or 90 south (Acquavita).—Stopes. The present yield is quite equal to that of the past month, both in quality and quantity.—Staboli Mine. Excepting an increase of water, no change has been noticeable in the crosscut west from Morghen adit.—Kint Concession. The lode in the Quaraxia winze is not carrying so much ore as when last reported, its present value being about 2 tons of 15 dwts. per fathom. The lode intersected by the Goja adit has now been cut through, and found to be 80 centimetres in width. In the course of a few days an end will be driven east on it, when its value will be ascertained and reported. The end east on supposed Depaulis lode has been suspended, and a trial commenced further north, as it is evident that the Depaulis lode must have passed through and not recognised at the time. The lode in the Kint end west maintains its width, and carries some fine pyrites, but no ore of value has been found during the present month.—Machinery. All is working satisfactorily and at full speed. The Pozzone hydraulic pump was restarted on the 12th inst, and the shaft has been forked to a depth of 6 metres.

WENTWORTH.—



**ALADDIN'S LAMP.**—Production and expenditure for the period from 1st October to 21st December 1895, inclusive: Production—Ore milled 868 tons of 2,240 lbs., yielded: 1,941 ozs. retorted gold, yielding £6,803 8s. 4d.; 452 ozs. gold in concentrates, of estimated value of £1,745; 586 ozs. gold in rich crude ore, of estimated value of £2,270; £10,818 8s. 4d. Expenditure—Mining, hauling, milling, concentrating, and general charges, £2,396 19s. 5d.; development (sinking shaft, No. 2 winze, extending main drives, &c., &c.), £1,554 13s. 5d.; additional plant, buildings, &c., £24 6s. 2d. The telegraphic returns received up to this date for the present financial year, which began on 1st Oct. 1895, are: October 28, representing three weeks production, 776 ozs.; November 25, representing four weeks production, 1,351 ozs.; December 30, representing five weeks production, 848 ozs.; January 27, representing four weeks production, 434 ozs.; February 24, representing four weeks production, 966 ozs.

**BARBERTON REEFS.**—The Mine Superintendent, under date of Feb. 21, reports by mail, as follows: I have made a discovery on the centre of our property—viz., a large open working some hundred or so yards in length; it has evidently been the work of people a hundred or more years ago. It is a deep trench put in on the south side of the bar. I am having a crosscut made to ascertain what has been their object.

**BUFFELSDOORN ESTATE & GOLD.**—The Johannesburg Consolidated Investment Company announce receipt of a report from the above company, containing the following: "Mr. Starr, consulting engineer to the company, reports that he has recommended the purchase for £25,000 of the Coal property under option, which will place the company in an independent position with regard to supplies. Underground, there are now about 164,000 tons of payable ore developed, and an excellent connexion has been made between No. 1 shaft and the main incline shaft. This opens up an immense body of ore, which can be taken out either through No. 1 shaft or main incline shaft. Twenty air drills are working, and within three weeks compressors will be able to furnish air for fifty drills. On the Buffelsdoorn Estate, generally, everything is in a satisfactory condition."

**BRITISH BROKEN HILL PROPRIETARY.**—Mine manager's report for the week ending February 5, 1896.—Blackwood Shaft, 300 level; west crosscut advanced 11 feet; total distance from plat 195 feet, face carrying fair grade sulphides. We mined 31 tons sulphides, average 16 per cent. lead, 13 ounces silver and 13 per cent. zinc.—Howell Shaft, 300 level; west crosscut from plat extended 14 feet, total length 290 feet, and stopped for present, face having entered country rock. Are starting a southerly drive off this crosscut at a point about 230 feet from plat in splendid sulphide ore. 200 level; No. 1, incline Winze off south drive sunk 9 feet, total depth 29 feet, still showing milling sulphides. We mined 65 tons sulphides, average 23 per cent. lead, 12 ounces silver and 25 per cent. zinc.—Surface. Everything connected with erection of jig plant being pushed on with all possible despatch; a fair quantity of machinery arrived during week, some of which has been placed in position.—Ore Shipments. We shipped 30 trucks carbonates to Port Adelaide. The parcel of sulphides just delivered to Block 14 Mine weighed 96½ tons net, and contained 28 tons lead and 1,299 ounces silver. The assays of following 5 lots have been agreed with Block 14 Coy.: Port Adelaide from previous deliveries—viz., 287½ tons net, carbonate ore from Marsh shaft containing 60½ tons lead, and 9,379 ounces silver.—Week's Assays. Carbonates, lead 20.5 to 24 per cent., and silver 26.6 to 46 ounces per ton; Sulphides, lead 10.5 to 27 per cent., zinc 12.7 to 29 per cent., and silver 9.1 to 15 ounces per ton.

**CLUTHA.**—Writing under date the 19th February, the Mine Manager reports: C winze: Average pannings all through winze 8 dwts. These pannings do not include the heavy visible gold, which would be difficult to estimate in pan, but consider that the whole shaft so far as we have gone should have a give 15 dwts. milling rock.—H winze: This winze is being sunk on the foot wall of lode, but we have to leave ledge matter standing on hanging wall side. The nature of the reef is as before, with seams of pyrites in places and frequently shows visible gold.

**GINSBURG.**—The Johannesburg Consolidated Investment Company announce receipt of a report from the above Company containing the following: Manager reports good progress in mine development during week ending 18th Feb. Main Incline Shaft is down 337 feet, and a considerable amount of work was done on the second level from No. 2 Shaft where the reefs are looking well, and assaying satisfactorily. West drive from No. 3 Shaft is now in 339 feet, and reef is 2 feet wide, assaying 12 dwts. 14 grains. East drive is advanced to 376 feet. Good progress is being made in the erection of battery house, and two new boilers have been erected and tested. This property is exceedingly well-off in regard to native labour.

**GLENLUCE.**—The Johannesburg Consolidated Investment Company announce receipt of a report from the above Company, containing the following: During week ending 17th Feb., 77 feet were developed. Main reef is considerably increased in size, but is not of so much value. Development will shortly be increased by the air drills now installed. Surface works are progressing satisfactorily.

**GEORGE GOCH AMALGAMATED.**—No. 1 section (George Goch Co.'s works). Report for the month of January: Mine—Number of feet driven, sunk, and risen, 606 feet 6 inches; quartz mined, 7,872 tons; less waste rock discarded, 3,020 tons; quartz mined and milled, 4,852 tons; quartz developed in excess of that mined, 2,751 tons. Mill—Number of days working (60 stamps), 21 days; number of tons crushed, 4,852 tons; yield in smelted gold, 1,308 ozs. 10 dwts.; yield per ton, 5.39 dwts. Cyanide Works—Number of tons of tailings treated, 2,700 tons; yield in smelted gold, 745 ozs. 14 dwts.; yield per ton, 5.52 dwts. Expenditure and Revenue—Working Expenditure: To mining (including maintenance), £3,363 10s. 5d.; to milling (including maintenance), £989 9s. 1d.; to general charges, £596 10s. 10d.; to mine development redemption, £1,213; cyanide working, £607 7s. 4d.; profit for month, £276 4s. 10d.—£7,046 2s. 6d. Revenue: By gold accounts—1,308 ounces 10 dwts. from 60 stamp mill at 73s. per ounce, £4,776 0s. 6d.; by 745 ounces 14 dwts. from cyanide works at 60s. per ounce, £2,237 2s. 6d.; by sundry revenue, £33—7,046 2s. 6d. Working Cost—Mining (including maintenance), 13s. 10.37d. per ton; milling (including maintenance), 4s. 9.04d. per ton; general charges, 2s. 5.50d. per ton; mine development redemption, 5s. per ton—£1 6s. 0.91d. per ton; value of yield, 19s. 8.24d. per ton; balance, 6s. 4.67d. per ton; cyanide working (including maintenance, 4s. 5.98d. per ton; value of yield, 16s. 6.85d. per ton; balance, 12s. 0.87d. per ton. No. 2 Section (Metropolitan Co.'s Works): Cyanide Works—Number of tons of tailings treated, 1,650; yield in smelted gold, 224 ozs. 12 dwts.; yield per ton, 2.72 dwts. Expenditure and Revenue—Working expenditure: To cyanide working, £513 12s. 5d.; to profit for month, £160 3s. 7d.; total, £673 16s. Revenue (by gold account): By 224 ozs. 12 dwts. at 60s. per oz., £673 16s. Working Cost—Cyanide working (including maintenance), 6s. 2.70d. per ton; value of yield, 8s. 2.00d. per ton; balance, 1s. 11.30d. per ton. It will be noted from the above report that the mill only ran twenty-one days, owing to the stoppage of the coal supply during the political crisis, and scarcity of native labour. The supply of native labourers is still very deficient, and it is feared that this will retard the re-starting of No. 2 Section Mill (Metropolitan Company's Works).

**KAPANGA.**—During the week the shaft has been sunk 6 feet. The reef in the shaft is 6 inches wide, worth 19s. 6d. per ton (say 6½ dwts.). Judging from the appearance of the country, I think we shall soon intersect another lode. The vein in the rise above the 800 is 12 inches wide, worth 52s. per ton (nearly 1 ounce), and shows signs of improvement. At the 500, the width of the reef is 4 feet. We are getting a little gold from the stopes in the 420 feet. Developments promise well at the 300 and 200. At Cortys everything is in good working order. We are now opening up on reef. Certain indications lead us to believe a favourable result may be looked for shortly in the surface workings. We are getting a little gold from throughout the mine. Conditions and prospects of the workings are most encouraging.

**LION (MOZAMBIQUE).**—Report of the Superintendent Engineer, Mr. Niness, for the month of January: No. 3 or New Drive has advanced during last month 10 feet, total length up to date 240 feet; this drive is in decomposed granite containing small leaders of gold bearing quartz. The end is harder for drilling but the holes break well. I hope to intersect another reef here at an early date. Drive west on new strike has been suspended during the month; total length of this drive 34 feet. Drive east on new strike has advanced 6 feet, total

length 41 feet; there is no change here to report either in the size or quality of the ore. Drive No. 2—the timbering of this drive is being completed.

**LIMERICK.**—Manager's report states: The complete fittings for saw-milling plant have come to hand. Everything is now ready and fixed in connexion with same. The saw-mill will be driven from the large portable Robey engine, which is built in opposite the main shaft in position for winding. Condensing plant working satisfactorily.

**MOUNT ROWE CONSOLIDATED.**—The Manager, under date of 12th February, reports: The Main Regina shaft is now timbered throughout. The slides or conductors are being put in, and a wooden brattice for an air way. The ladder way is also being put down the brattice way. Application has been made for exemption on all the other leases except the Regina north, and granted for one month. Progress has then to be reported to the Warden, when, if satisfactory, further exemption will be granted. This has to be done owing, as the Warden says, to some companies taking up large areas of ground, concentrating the whole of their work on one lease, and selling off the remaining portions. It is expected that water will be reached in the main shaft at a depth of about 180 to 200 feet. This depth should be quickly reached, as at present the country is not difficult to sink in. It is very difficult to get material up the line, and there is no paraffin oil in the place, consequently we cannot give our oil engine a trial run till this arrives. The railway is entirely blocked, but supplies may get up any day. It is not expected that the railway will be finished to Coolgardie before the middle of March.

**MAY CONSOLIDATED.**—The Directors submit the following report for the month of January: Battery—100 stamps ran 23½ days, reushed 10,250 tons; gold won, 3,168.30 ozs. (average 6,182 dwts. per ton), valued at 72s. 6d. per oz., £11,485 1s. 9d. Cyanide Works: Siemens process, 8,000 tons tailings treated; bullion won, 1,880 ozs., equal to, say, 1,410 ozs. fine gold (average 3,525 dwts. fine gold per ton), at 80s. per oz., £5,640; other receipts, £38 2s. 6d.; total £17,163 4s. 3d. Working costs: Mining 10,250 tons cost £6,826 9s. 2d., 13s. 3.89d. per ton; development, £1,337 3s. 5d., 2s. 7.309d., total, £8,163 12s. 7d., 15s. 11.148d.; tramming, £337 10s. 6d., 7.903d.; crushing and sorting, £256 3s., 5.998d.; milling, £2,391 4s. 10d., 4s. 7.990d.; total, £11,148 10s. 11d., 21s. 9.039d. Tailings treatment: Siemens process, 8,000 tons, £1,230 3s. 2d., 3s. 0.904d.; total, £12,378 14s. 1d.; profit, £4,784 10s. 2d. Expenditure on capital account: Construction, &c., £3,400 4s. 4d.

**NEW HEIDELBURG, ROODEPOORT.**—The Johannesburg Consolidated Investment Company announce receipt of a report from the above company containing the following: "Manager's report for week ending 21st February states that, in spite of the scarcity of native labour, works are being proceeded with as rapidly as possible. Sinking of main shaft is being continued, and reef at bottom is showing up very well; Panning from 10 dwts. to 12 dwts. per ton. Erection of battery plant is well in hand, and other surface works are going ahead. The new reef is being opened up."

**OOREGUM.**—Superintendent's report for fortnight ending Feb. 25: Taylor's shaft sunk 14 feet—depth below the 860 feet level, 80 feet. The lode is mixed and not well defined, chiefly schist interspersed with a little quartz, which gave by assay 12 dwts. of gold per ton. The 860 feet level south driven 30 feet 6 inches; total, 136 feet. Lode 2 feet wide, assay value 1 oz. 17 gr. No. 1 Winze 860 feet level south commenced, sunk 7 feet. Lode 1 foot 3 inches wide, assay value 1 oz. 12 dwts. 16 gr. The 860 feet level north driven 14 feet 6 inches; total, 55 feet from shaft. Lode 1 foot wide, assay value 13 dwts. 6 gr. The 760 feet level south driven 14 feet; total, 525 feet 6 inches. No change in the character of the lode—still very small. No. 3 Winze 760 feet level south sunk 6 feet 6 inches; total, 34 feet 6 inches; width of lode, 1 foot 4 inches; assay value, 2 oz. 5 dwts. 17 gr. No. 3 Rise 760 feet level south risen 8 feet 6 inches; total, 26 feet 6 inches. Lode 9 inches wide; assay value, 2 oz. 18 dwts. 18 gr. No. 3 Winze 660 feet level south sunk 3 feet 9 inches; total, 49 feet 9 inches. Lode 1 foot wide, assay value 14 dwts. 4 gr. No. 4 Winze 660 feet level south sunk 2 feet 6 inches; total, 10 feet 6 inches. Lode 1 foot wide, assay value 10 dwts. 21 gr. Walroth Shaft: The 1,160 feet level south driven 9 feet 9 inches; total, 26 feet 9 inches. The 1,160 feet level north driven 12 feet 3 inches; total, 26 feet. The reef in each direction is distinguished only by a small division, well defined, carrying a little mineralised schist. These drives are suspended whilst the shaft is being sunk and ground excavated for shoot pass in the footwall, which we expect to get completed by the end of March. After that we shall be in a position to resume drivages and sink shaft at the same time. The 1,060 feet level south driven 18 feet 9 inches; total, 246 feet 3 inches. Lode very small—no sample. The cross-cut west, 1,060 feet level south driven 15 feet 9 inches, total distance 88 feet. No discovery. No. 1 Winze 1,060 feet level south sunk 7 feet, total 28 feet 9 inches. Lode very small. The 1,060 feet level north driven 17 feet 3 inches, total 186 feet 9 inches. No. 1 Winze in this level sunk 6 feet, total 32 feet 6 inches. The lode at each of these points continues small and of no value. The 960 feet level south driven 29 feet 3 inches, total 715 feet 3 inches. No. 2 Winze in this level sunk 3 feet 9 inches. Total 69 feet 6 inches. Lode at each of these points small and of no value. No. 3 Winze in this level sunk 3 feet 6 inches, total 22 feet 3 inches. Lode 6 inches wide, no sample taken. The 960 feet level north resumed, driven 4 feet 9 inches, total distance from shaft 131 feet 6 inches. Lode 6 inches wide, no sample taken. No. 6 Winze 760 feet level south sunk 7 feet 6 inches, total 88 feet 6 inches. Lode 2 feet 3 inches wide, assay value 8 dwts. 17 grs. Communicated with the 860 feet level south. No. 1 Winze level north from crosscut east 460 feet level south sunk 5 feet 3 inches, total 44 feet 9 inches. Lode 1 foot wide, assay value 9 dwts. 19 grs. No. 1 Rise level north from crosscut east 460 feet level south risen 6 feet, total 48 feet. Lode 3 inches wide, assay value 7 dwts. 15 grs. The 460 feet level north driven 14 feet, total 284 feet 6 inches. Lode still carries 2 inches of quartz. Low's Shaft sunk 3 feet 6 inches, total 814 feet 4 inches. Together with the sinking we are excavating for a shoot pass in the hanging wall of the shaft, which, when completed, will expedite the hauling of quartz, &c., from this level to surface. The 810 feet level south of east driven 13 feet 6 inches, total 55 feet 6 inches from shaft, average width of lode at point of intersection 4 feet—on which we have driven south 8 feet 6 inches and find the lode maintains its width being still 4 feet wide, and gave by assay 7 dwts. 20 grs. of gold per ton. The 710 feet level south driven 17 feet, total 285 feet. Lode 3 feet 3 inches wide, assay value 10 dwts. 21 grs. No. 1 Winze 710 feet level south sunk 4 feet, total 71 feet 6 inches. Lode 4 feet wide, assay value 12 dwts. No. 2 Winze 710 feet level south sunk 4 feet 3 inches, total 13 feet 6 inches. Lode 1 foot 9 inches wide, assay value 6 dwts. 12 gr. No. 1 Winze 710 feet level south driven north on lode from point of intersection sunk 4 feet 9 inches, total 47 feet 6 inches. Lode 1 foot 6 inches wide, assay value 9 dwts. 19 gr. No. 1 Rise 710 feet level south driven north on lode from point of intersection risen 8 feet, total 48 feet. Lode 6 inches wide, assay value 8 dwts. 17 gr. The 610 feet level south driven 5 feet 3 inches, total 275 feet 6 inches. Lode 3 inches wide, assay value 7 dwts. 15 grs. No. 1a Winze 610 feet level south resumed, sunk 2 feet 6 inches, total 25 feet. Lode 4 inches wide, assay value 12 dwts.—Probyn's shaft. The 1,150 feet level north, driven 11 feet, total 40 feet. Lode 9 inches wide, assay value 6 dwts. 12 grs. The level east of south 1,050 level south driven 11 feet, total 129 feet. Lode 4 inches wide, assay value 5 dwts. 10 grains. No. 1 Winze level east of south 1,050 feet level south sunk 4 feet, total 22 feet 6 inches. Lode 2 feet wide, assay value 7 dwts. 20 grains. No. 1 Winze 1,050 feet level north sunk 4 feet, total 103 feet. Lode 4 inches wide, assay value 6 dwts. 12 grains. Throughout the Mine 70 stopes are being wrought on, which will be measured at the end of month and full particulars will be given in next report.

**ROODEPOORT GOLD.**—The Johannesburg Consolidated Investment Company announce receipt of report from the above company, containing the following: "According to manager's report for week ending 20th February, mine is continuing to show up well in course of development, especially in the lowest levels. The new incline shaft is now down 270 feet. Air compressor plant is working satisfactorily; old tailings are not yet exhausted, but there will be a final 'clean-up' shortly. The starting of the 40 stamp mill will be dependent on the supply of Native labour, and completing of sorting arrangements. The latter are now in hand, and we hope soon to get the better of the labour difficulty."

**RICHMOND CONSOLIDATED.**—The Manager, under date of

12th February, reports as follows: The underlie shaft has now been carried down a depth of 96 feet. A connexion has been made with the main vertical shaft for ventilation. The width of the reef at this depth is 4 feet 6 inches of good solid stone. Following the reef on the underlie shows that it has been very much thrown about, pinching and making very rapidly. As the reef gets into more solid country no doubt it will be more regular. We are now pushing ahead as rapidly as possible, so as to form a connexion with the bottom level when we can drive along the course of the reef north and south, and so prove its value.

**SALISBURY-MURCHISON.**—The following report upon the property for the month of January has been received by the Directors: Salisbury-Murchison Gold Mine Limited, Cue, West Australia, February 2, 1896. Operations during the month of January have been confined to sinking the engine shafts on the Salisbury and Agamemnon properties and building foundations for the machinery. The main shaft on the Salisbury Lease has been sunk 30 feet, full depth from the surface 90 feet. This shaft has three compartments—viz., two winding shafts 3 feet by 3 feet 6 inches in the clear, and one pump shaft 3 feet 6 inches by 3 feet 8 inches in the clear, which will give plenty of room to fix a 10 or 12 inch column of pumps when they are found necessary. In the north prospecting shaft, distant about 2 chains from the engine shaft, good fresh water has been tapped at about 100 feet from the surface. This is a most important feature in our developments, and, judging from the present inflow, I am of opinion that at about 150 feet from the surface ample water for milling purposes will be found. In the course of a week or ten days I hope to proceed cross-cutting for the reef at the 50 feet level. The country is favourable for driving, and we should reach the lode in four or five weeks' time. Main drives both north and south will then be constructed, from which trial crushings will be taken from time to time as these levels proceed. The quality and quantity of ore in sight will then be accurately known, and will serve for future reference when the question of erecting a battery is under consideration. The foundations for engine and boiler are in a forward state, and I hope in the course of a few days to place some of the machinery in position.—Agamemnon Lease. The main shaft on this property is down 76 feet, I expect to go 130 or 140 feet from the surface before reaching water; when this is done, trial crushings along the course of the reef will be made as the main drives proceed. This shaft is favourably situated for working the Tasmania and Agamemnon Leases, and the erection of one plant will be sufficient to work both properties. A prospecting shaft has been commenced at "A" which will be carried down on the underlay of the reef. The developments in this shaft will have an important bearing on future operations in this direction. I shall report from time to time what results we obtain.—Tasmania Lease. The lode at the 50 feet level is being cut through; when this is done, trial samples of the stone will be tested, and if necessary, assayed. The Minister of Mines has granted six months' exemption from the labour covenants on the North Agamemnon and Huntingtower Leases, to enable the labour to be concentrated on the Salisbury and Agamemnon properties during the erection of machinery.—(Signed) E. Wattis, Manager.

**TOLIMA.**—A circular issued by directors states: The mineral is now coming forward with great regularity, the greater part accumulated during the revolution having been cleared off, whilst all the produce of 1894 has been realised, and the whole of the mineral for the months of January to May, inclusive, of the past year has arrived in this country and is in course of realisation. A further division of profits will be made as soon as possible, but the shareholders must bear in mind that it is impossible to divide the profits as soon as realised, owing to the limited amount of capital which the company have at their disposal, as shown by the balance sheet for 1894.

**TIGER (MASSI KESSE).**—Report of the Superintendent Engineer, Mr. Niness, for the month of January.—Drive No. 1 during last month advanced 21 feet, total length 383 feet; the end is composed of soapstone containing a little water. The latter is considered a good indication, and is doubtless coming from the reef to which we are driving.—Drive No. 2. Some extra timbering has had to be done here in consequence of the rains. Drive from cutting to greenstone dyke has advanced 41 feet. We are meeting with small boulders of greenstone in the soapstone the drive is penetrating, which is a sign that we are approaching the dyke.

**WESTLEIGH.**—Extracts from Engineer's Report to the Board of Directors, dated 27th January, 1896: Scheme of Mine Development. Sinking two main incline shafts and four verticals, at the same time prospecting along croppings of the reef.—West Incline Shaft. Has been sunk 320 feet at an average dip of 18 degrees; at 290 feet a downthrow was encountered, the reef dropping 20 feet. This dropping necessitated the regrading of the shaft, delaying the sinking of the shaft six weeks. The reef up to date has averaged 9 inches in width and is not payable, but what you have now the south side of the dropper is facsimile to the Eastleigh's East Shaft and may bring you into pay ore.—No. 1 West Vertical Shaft. Has been laid out in line with the incline but 840 feet from the croppings (9 by 5 inside timbers), depth 68 feet, a heavy roll of the strata caused the timbering of this shaft, which is now just completed. I believe through this roll the reef may be struck at any time, certainly two months hence. The shaft equipment here consists of a horse whim and a serviceable little headgear, the rock and water being raised by a pair of kiddles.—No. 2 West Vertical Shaft. Has been laid out on the same lines as above, only 1,500 feet from the cropping (5 by 9 inside timbers), depth 38 feet, though shaft is in limestone, and as it is impossible to contend with the water, I should advise the immediate purchase of a 20 h.p. boiler, a small 10 h.p. winding engine, and a Knowles pump with steam and water pipes. It is a most important shaft, and every aid should be given your manager for forcing the work. In reviewing the system you have adopted for opening up this section of your property, I am of opinion you could not possibly have improved upon it. I consider if you grant the machinery for No. 2 west by the end of the year, this section of your ground will be thoroughly exploited.—East Incline. Re 3 claims on the croppings of the reef at this section of your property, I think if you can even now purchase same for £300, it will repay you, not that it is valuable and payable, though I have already stated you might prove up a large low grade but payable quartz, also a saving in the expense of plant to carry the incline down. At present this incline is started 1,250 feet from west shaft and tapped by a small vertical sunk near the border line, thence driven on the incline and parallel to the west incline shaft for a distance of 55 feet. Angle of dip, 10 degrees. Width of reef leader, 18 inches. Patches of pay ore have been encountered here, but nothing of a permanent character, though the reef looks kindly and hopeful. No. 1 East Vertical is in line with the incline, but 600 feet from the boundary, depth 50 feet. This shaft has been left standing since September for want of labour. When the supply increases, a horse whim and head gear will have to be constructed. No. 2 East Vertical is laid out as above and 1,200 feet from the boundary (3 feet by 9 feet) inside timbers, depth 100 feet, and is in limestone. South of this shaft presents on surface the only needed strata in this East section of your property, and if water such as you have in No. 2 west, the same plant will be required as stated for that shaft.—General Conclusions. The work has not advanced as fast as I desired through the impossibility to obtain native labour. That you are now and will be for the next six months attacking most important sections—viz.: West Incline, No. 1 West Vertical, goes without doubt and will prove the value of your property. I never expected to strike courses of ore till the first break was passed, and this has now occurred; so attacking this zone from the Incline, combined with the No. 1 shaft west and her zone and the tapping of the reef in No. 2 West Shaft will give you the lists you require.—Finances. I am of opinion my estimate re total costs will prove correct. The mine 32 per cent. is now completed, while 29 per cent. is only expended. Buildings £1,650 against £1,800 estimated. Shaft equipment £1,000 against £1,250 estimated, so that the plant I have advised is well covered. General charges £1,000 against £5,000 estimated. Glancing at these figures and plenty of native labour, the expenditure will cover the estimate. The time to carry the work out has proved incorrect through unforeseen difficulties.—Surface Arrangements. Dwellings, office, store, houses, &c., &c., are of suitable design, well planned and constructed, and I take this opportunity to inform you that your Manager is "deserving of praise for the way he has and is carrying on the work."



**AUSTRALASIAN.**—Fortnightly report of Mr. John James, Manager, dated January 30: During the past fortnight Bishop and party have sunk the shaft 17 feet, total 684 feet; and timbered 27 feet—total number of feet timbered, 670. There is nothing fresh to report, the sinking is still very hard. The country sunk through is a mixture of diorite and grey wackey. The water still keeps about the same.

**BIG BLOW.**—Report received from Mr. W. M. Vivian, Mines Manager, dated 12th February: In resuming my fortnightly report I beg to say work has been re-started at the various points.—Battery. The battery, engine, boilers, automatic feeders, stone breaker and battery house are all in position and quite ready to start, but we have still the amalgamating tables, sluice boxes and settling tanks to construct. The pine timber for those has only just reached us from Freemantle, having been under order for months past. We are still without the requisite carpenters to hurry on with this latter work; large numbers of men are daily arriving in Coolgardie, but they are all of the labouring class. Carpenters, fitters, engine-drivers, bricklayers and artisans of all kinds are in keen demand.—Water Shaft. This has now reached a depth of 281 feet, and I have decided to suspend the sinking, and, at a point 270 feet from the surface, commence the drive to tap the reef. This drive will be about 140 feet long. I regret to say the quantity of water in the shaft is steadily decreasing, but I have no doubt the tapping of the reef will give us a good increase; note this crosscut will intersect the reef at a depth of about 300 feet, as the crown of the reef is about 20 feet above the mouth of the shaft.—Mixing boiler at Second Water Shaft. This will be proceeded with as soon as we can secure a bricklayer.—Rain. A short sharp thunder-shower passed over the mines yesterday, but the rain which fell was quickly absorbed by the hot soil and had no effect upon the various dams in the district, which are in the same empty state they were six months ago.—The manager further writes in explanation of the delay which has taken place in the starting of the battery, as follows:—This work would have been accomplished in much less time had it not been for the following heavy drawbacks: 1st. The death of workmen. There were periods when we were absolutely at a standstill for want of carpenters, fitters, engine-drivers, bricklayers, brickmakers and blacksmiths. 2nd. The great heat of October, November and December, which prevented the men from doing anything like hard work. 3rd. Sickness of men and staff, scarcely a man of whom but was laid up at some part of the time, many of them being carried to the hospital. Typhoid fever, dysentery and influenza being the troubles. To these foregoing drawbacks must be added that of the irritating and vexatious delays which we were subjected to whenever we required any materials from Perth or Freemantle, a delay of two or three months being a common occurrence. It will therefore be seen that we have had considerably more than the ordinary difficulties of mining in a new country to contend against, and we have had an uphill time of it in erecting our plant and developing the mine under these very adverse circumstances. Our calculations, as to the time when the battery would be ready to start, have been completely upset by them.—Note by the Secretary: It will be remembered in connection with the above, that the manager cabled on the 10th inst., stating that crushing would definitely commence on the 13th inst.

**COROMANDEL.**—Superintendent's report for fortnight ending February 22: Prospect Shaft. Since last report, a tip plat has been excavated below the 600ft. level, and the sinking of the shaft has been resumed. It is now 14ft. below the level. The 600 crosscut has also been restarted, and is now 16ft. from the shaft.—500ft. Level, South. The crosscut (east) is advanced 21 ft.; total, 402ft. No change.—200ft. Level, North. The winze below this level has been sunk 6ft., total 53ft. 6in. The lode is 3ft. wide, worth 1 oz. 10 dwt. of gold per ton. East Shaft, 600 ft. Level, North of Winze. Driven 25 ft., total 33 ft. Lode 1 ft. 6 in. wide, assaying 8 dwt. of gold to the ton.—500 ft. Level, North. Driven 4 ft., total 174 ft. 6 in. Lode, 3 ft. wide, of solid quartz worth 1 oz. of gold to the ton.—300 ft. Level, North. Driven 30 ft., total 431 ft. from shaft. Leader in end is 3 in. wide, and the assay value is 2 dwt. 12 grs. of gold per ton.—200 ft. Level, North. Driven 23 ft. 6 in., total 381 ft. 6 in. There are three branches of quartz in the end, aggregating one foot wide, and the assay value of this quartz is 5 dwt. of gold per ton.

**GOLD FIELDS OF MYSORE.**—Mine report for fortnight ending February 25: South shaft. The 280 feet level end north on west Balaghat lode has been driven 10 feet 6 inches, total 207 feet 6 inches. Lode 3 feet wide, showing arsenical pyrites throughout with about 6 inches of quartzose rock against the hanging wall, assaying 15 grains of gold per ton. The cross-cut East has been extended 14 feet, making its total length 413 feet 9 inches from the Oriental lode. No change to remark.—Oriental lode. The 280 feet level north has been lengthened 17 feet 6 inches, total 330 feet 3 inches. The lode formation is 3 feet 6 inches wide of no value. Finding this level is to the east of the rise—from the 380 feet level—driving has been discontinued and a cross-cut started west to effect communication with the same. No. 1 Stope above this level—mixed quartz 10 feet wide, assaying 4 dwts. of gold per ton. No. 2 Stope, lode, 3 feet wide, assaying 3 dwts. 10 grains of gold per ton. The 380 feet level north. The cross-cut west has been extended a further distance of 15 feet, total 158 feet. It has traversed a lode running about parallel with the Oriental lode with a slight underly to the east. It is 3 feet wide, composed of mixed quartz and country rock, assaying 15 grains of gold per ton. This lode will be opened on when the cross-cut is advanced sufficient to enable us to do so. No. 2 Rise risen 6 feet 6 inches, total 110 feet above the level. It is following upon the line of the Middle shaft in country rock. The end driving south has been lengthened 10 feet, total 429 feet. It is still going north in Dyke rock and does not give any quartz. No. 1 Stope over this level lode, 5 feet wide, assaying 4 dwts. 2 grains of gold per ton. No. 2 Stope, lode, 3 feet wide, assaying 3 dwts. 12 grains of gold per ton. No. 1 Stope over the north level assays 3 dwts. 8 grains of gold per ton. The 470 feet level north has been lengthened 10 feet, total 178 feet. The lode formation is about 4 feet wide, showing vertical stringers of quartzose matter, but of no value.—South Shaft sunk 3 feet, making its depth 31 feet under the 470 feet level. The lode is 7 feet wide, carrying about 3 feet of quartz, its assay value being 5 dwts. 2 grains of gold per ton.—Middle shaft. The Plunger lift has been completed to the 335 feet level. The ladder way and bucket road repaired and a gutter cut around the shaft to prevent all water possible from going below the level, and sinking of the shaft will now be commenced.—Prospecting Shaft. Golconda block: this has been sunk 3 feet, total 76 feet from surface. The rock has become much harder and does not carry as much pyrites as formerly. Sinking will be continued a little further to see if any improvement sets in.—Ajjappalli. Fair work is being done in cutting down and timbering the shaft which is finished down to the water (75) seventy-five feet from surface. The engine is on the ground and will be erected as soon as possible. We are making a new road from the main carriage road to Ajjappalli shaft for conveyance of coals, timber, &c.

**HAMPTON PLAINS.**—The following reports have been received from the Agents in Western Australia, January 25: On reef, south of Homestead, on block 59, a shaft has been sunk 10 ft., logged up, and a windlass erected. The lode is three feet wide and the quality of the stone is improving with depth. Two men are employed at above shaft. February 3.—The shaft, south of Homestead, has been sunk 8 ft., making total depth of shaft 18 ft. The lode is on an average 2 ft. 6 in. wide. The stone shows gold freely and is improving with depth. Two shifts of men will be started in this shaft next week. I have had two men cutting trenches along the line of reef during the week. Feb. 8.—Shaft, south of Homestead, sunk 9 ft., making total depth from surface 27 ft. The lode is well defined, and has an average so far of 2 ft. 6 in. in width, and the stone shows fine gold freely. Pieces of stone that one cannot see gold in dolly very fair. During the week two men have been prospecting north-east from the Homestead, with the result that two nice looking reefs have been opened out. One of these reefs is highly mineralised, and carries a little gold by dollying. I intend to sink small Conquer pits along the line of above-mentioned reefs, to see if they improve with depth.

**HANNAN'S REWARD.**—Extract from Manager's letter, dated February 8: Since I left for my holidays, the Winze has been sunk on the Main Reef, and the North Drive has been extended further, so that we now have a considerable quantity of ore in sight. . . . I think the lode at 300 feet level is going to be good, on account of the very coarse gold showing in the veins that are dipping into it at that depth. . . . The Mine is very well spoken of in the other Colonies.

I was congratulated very often during my holidays on the way the mine has been opened up. . . . With reference to the cost of stopping, you must not compare the cost of stopping a 3-inch vein with the main reef. On a 3-inch vein you have to do a lot of driving to get a ton of ore, but on the main reef there is not the least trouble to break down a ton of ore. . . . Main Shaft has been timbered up a distance of 4 feet from the bottom, and a cross-cut east has been started from the 300 feet level to cut the Main Reefs. . . . No. 1 Winze Main Reef has been sunk a further depth of 2 feet, total to date, 66 feet. At present the reef is poor, but, as we have passed through a shoot of payable stone, we must now expect a poor shoot for a short distance. . . . Some of the stone from 312 feet in the Main Shaft carries very coarse gold. Pieces weighing as much as 2 and 3 dwts. are to be seen in some of the stone, so it does not look as if the gold were dying out in depth.

**LINDSAY'S.**—Progress report for eight weeks, ending February 6:—Owing to my absence on leave one four-weekly report has been missed; hence the present one includes eight weeks. During that period we have sunk 24 feet, driven 31 feet, risen 21 feet. The work opening up and testing the schute of gold-bearing stone from the No. 1 level of No. 1 shaft upwards has produced very promising results, inasmuch as I am now confident that we have a nice reserve of payable ore in sight. From what has been thus proved I estimate that we have quite 2,000 tons of ore to draw upon, and as far as samples allow me to judge, I believe that this will yield at the rate of 2 ounces gold per ton, representing a value of some £12,000. Of this stone about 12 to 14 tons has been bagged for transport to the Dry Crushing Plant or elsewhere for treatment. I regret to say that this fine schute of stone does not make down below the No. 1 level. This fact has been proved by sinking winzes. It is now seen that the reef has been broken or faulted just below the No. 1 level, and further prospecting is necessary to find the location of the main portion of the reef. From the existing indications I am of opinion that the reef lies to the east of No. 1 shaft. I am now following the line of fault eastward from the shaft, and hope to pick up the reef again before very long.—No. 4 shaft. This is now down 185 feet vertical, and continues to carry the pyrites and quartz lode mentioned in previous reports; a little water shows occasionally, and we shall, I trust, reach the permanent water level before long. The large Winding Engine sent by you is now being erected at this shaft, and will be ready for steam in a few days. I purpose arranging it so as to also haul from the No. 1 shaft, and so do away with the necessity of a whip horse. The Dry Crushing Plant has been erected on a suitable sight on the Lindsay's Extended Company's lease, and the machinery has been put at work. Owing to a variable supply of water for steam purposes no long-continued runs have been possible. The whole plant has been substantially erected. It comprises a rock breaker, a granulator or mill, and a terra-secca gold separator. This last shows itself capable of saving the gold by dryblowing. But the granulator or mill is far too small and inefficient to keep the separator at work. We have crushed a small parcel of the Lindsay stone, but the cost as produced through the slowness of the granulator is too great to allow profitable results to be produced. Three men have to be employed at the plant, and with a quicker grinding mill I feel sure that I can give you a satisfactory return from the mine. It will be expedient to effect a change at this point in the plant as early as possible. Owing to the present unsatisfactory conditions I have ceased sending any more of your ore for treatment.—Water. We are drawing our supplies from the shaft on the Lindsay's Extended lease. At present, however, their shaft has not entered the permanent water level, and the supply is therefore very intermittent, but this will improve. Our condenser is working well, and we do not now have to buy water.—E. Davenport Cleland (General Manager).

**MOUNT ROWE CONSOLIDATED.**—The Manager, under date of 6th February, reports as follows: By this mail under separate cover I am forwarding photographs showing the work done on the surface at the Regina north shaft. This shaft is nearly timbered throughout, and when finished will be second to none on the field—although rather small, and this I could not see my way clear to alter without causing great delay—and this shaft seems to be the key to the position as it will prove the parallel reefs throughout the property. This was quite accidental, as in the first instance it was an underlie and then continued as a prospecting shaft, and now we have struck an entirely new reef which I have traced and opened into the Regina lease. As soon as this shaft is geared up I expect to develop on the reefs very rapidly and produce at least forty tons of quartz per day. Under these circumstances I hope you will see the necessity of at once forwarding a ten head dry stamp mill and cyanide plant to treat the product. I feel it is impossible to lay down decidedly the kind of plant required under the conditions of this field until further experiments have been made. But I am convinced that no mistake can be made by sending a ten head dry stamp mill with cyanide vats, and two amalgamating pans and settler, with oil engines for motive power.

**NAMAQUA COPPER.**—Abstract of Superintendent's report for January: Twofontein Mine.—The sinking of the shaft below the 125 fathom level continues. The ground is gneissic rock. 125 fathom level East. The ore ground at this level is chiefly blue, and although it is mixed with a large proportion of chlorite and iron, it dresses up to a good percentage. Worth 6 tons of ore per fathom. 115 fathoms level East. A cross-cut has been driven south through the copper ground. The fore-blast is directly under the stope in the 105 fathom level, and seems to promise a large extent of ore ground in this neighbourhood. Worth 6 tons of ore per fathom. Stopes: 105 fathom level east, 105 fathom level west (north stope), 105 fathom level west (south stope). There is no change to notice in any of these stopes. They yield 7, 10, and 7 tons of ore per fathom respectively. No. 2 Shaft.—Stopes, Nos. 1 and 2 in the back of the 25 fathom level. There is very little change here. Each stope yields 8 tons of ore per fathom. No. 4 Shaft.—Intermediate level: As far as can be seen a large area of fairly good ground about this place is being laid open. Worth 8 tons of ore per fathom. 12 fathom level east: The breadth of the lode is about 6 feet. A winze is being prepared to communicate with the intermediate level 12 fathoms below. Worth 6 tons of ore per fathom. 12 fathom level west: In this direction the lode is small and poor. No. 5 Shaft.—Cross-cut north. A small portion of yellow copper ore has been met with in this driving. The level is being extended in a westerly direction. Wheel Julia.—Central shaft. The ground so far is chiefly quartz, containing a few spots of copper ore. Shipping.—The Glanraon arrived at Swansea on the 13th March, with about 750 tons of ore. Output for February.—600 tons of ore of 24 per cent.

**ORIENTAL.**—Mine report for fortnight ending February 22: Taylor's Engine Shaft. There is no change to report in regard to the ground, but the water is sufficient to supply the boilers of the winding engine and the air compressor. During the two weeks 84 feet were sunk, making the total depth 115 feet; and as we have now commenced sinking with rock drills, we hope to make good speed henceforth.—Bridge Shaft. The quartz through which we are driving in the 105 feet level south is about 3 feet wide, and is very hard indeed, consequently the progress with hand labour is about as much as we can expect. The total length of the level is now 130 feet, of which 2 feet has been driven since the previous report. A sample taken from the lode yielded 4 dwts. of gold per ton.—Trial Shaft No. 2. Here we have attained a total depth of 50 feet, 54 feet being sunk in the fortnight. Progress in sinking has been somewhat impeded on account of the water met with, while the men have also been engaged in squaring and timbering down the shaft. Neither in regard to its composition or its width is there any change to note in the lode, which continues very strong and regular, and carries 12 grains of gold per ton, according to the assay of the sample obtained therefrom.—Surface Operations. I have now the pleasure of reporting that the Air Compressor has been started, and the engine is working very satisfactorily. Other surface works are being carried forward without delay.

**OURO PRETO.**—Passagem Mine report for January 1896: Incline shaft No. 1 was sunk 3.00 metres, and is now 51.40 metres below the 605 metre level. Sinking will be suspended for the present, to allow of the roof being opened up for starting a new level. 505 end S.W. was driven 3.80 metres in schist, carrying small quantities of quartz. 470 end N.E. was driven 4.70 metres; it carries a bar of schist against the roof, but the rest of the end continues in strong quartz lode. Cross-cut at 470 N.E. was driven 2.40 metres in footwall schist. 470 end S.W. from No. 2 shaft was driven 1.30 metres in lode 1.50 metres thick, with schist below. The

quartz carries a fair amount of pyrites, but is of low grade. 470 end N.E. from No. 2 shaft was driven 2.40 metres in schist without ore. 435 end S.W. was driven 2.40 metres in close quartzite. End under 435 in No. 2 shaft was driven 1.70 metres, full size in low grade quartz. 400 end N.E. was driven 4.40 metres. Against the roof there is a branch of ore 1 metre thick carrying strings of pyrites, but the lower part of level is in quartzite. Crosscut at 400 N.E. was driven 2.40 metres in hard quartzite. Crosscut at 365 N.E. was driven 4.70 metres in schist under the lode. Rise under 365 in No. 2 shaft was advanced 2.30 metres. It is being put up to facilitate removal of stuff from the trial stope recently opened from shaft. Rise at 365 S.W. was advanced 3.60 metres in schist. 315 end N.E. was driven 3.70 metres in mixed lode of quartz and quartzite. Winze at 315 N.E. was sunk 5.50 metres, and being now at the depth of the 365 level, an end has been started to meet the cross-cut from that level. Rise over 315 N.E. was advanced 3.60 metres, and appears to be entering the ore shoot above, the branch of ore against the roof having gradually increased in size. 315 end S.W. was driven 2.40 metres in mixed lode of quartz and schist, carrying in places patches of pyrites, and much harder than formerly. 215 end N.E. was driven 1.60 metres full size in strong quartz lode, carrying strings of pyrites throughout. Stopping.—The stopes at the 435 level continue to be very productive, the lode being from 6 to 9 metres thick, and composed of massive quartz of good average yield throughout. These stopes have produced about one-third of the ore milled during the month. At the 470 level, two small stopes were worked, and though the full height of the lode has not been reached, it looks quite as promising as at the 435 level. At the 400 level, the stopes between the shafts have reached the limit of the ore shoot, and the ore being too small to pay for working, stopping has been suspended. S.W.: At this level the ground around Rise 28 is also nearly exhausted, the stopes having holed to the 365 level. There still, however, remains some ground on the other side of the rise. N.E.: At this level the lode in one stope is over 5 metres thick, most of which is clean milling ore. In the other stope, the full height of the lode has not been reached, but at present it carries a large proportion of quartzite. At the 365 N.E., the stope is holding up in a regular body of ore about 4 metres thick; but composed of quartz of rather low grade with little pyrites. S.W.: At this level the lode in stopes is 3 metres thick, and the quartz carries patches of pyritic and tourmaline ore throughout. At the 315 N.E., on Buraco Secco shoot, little stopping was done, the men being employed in sinking the winze, which when communicated will facilitate removal of the ore. S.W.: At this level the two stopes near Rise 31 continue in a strong body of lode, nearly 5 metres thick, carrying good patches of pyrites, though at times the ore is split by big horses of schist and quartzite. Near No. 1 shaft stopes have crossed the level, and ore is being taken up under floor of old stopes. Under the 265 level the lode in stope carries a good deal of quartzite and schist interstratified with the ore, the ore averaging altogether about 2 metres thickness. Over the 235 level a good regular body of ore is holding up, but the decomposed nature of the roof necessitates a good deal of work in securing and filling. At the 215 N.E., the outer stope continues in a strong massive body of quartz, but in the inner stope about one-half of the lode is at present composed of quartzite.—(Signed) Henry J. Gifford.

**TRUE BLUE (HANNAN'S).**—Mine Manager's report of progress to February 4: No. 1 Shaft, 100 ft. Level. North-east cross-cut has been extended a further distance of 42 ft., making total distance driven from shaft of 67 ft. At a distance of 45 ft. from the shaft several small leaders were passed through; it was at this point I expected to intersect the leaders opened in the Underlie shaft.—Underlie Shaft. The Intermediate level has been driven 37 ft. 6 in., total from shaft 88 ft.; there are 10 in. of vein stuff in the end. The winze mentioned in last report has been sunk 26 ft. from the stopes and holed through to the drive, which has improved the ventilation.—Shaft A. The surface portion has been timbered logged above surface 5 ft., and sunk a further distance of 11 ft., making a total from brace 25 ft.—Jubilee Section, Jubilee Shaft. The cross-cut at the 100 ft. level has been driven 7 ft., the country is hard for boring and difficult to work, but contains fair amount of mineral.—Shaft B. This end on the lode at the 50 ft. level has been driven 3 ft. north-west from the cross-cut, quality of the lode is about the same as last reported. I have let contract for driving south-east at this level a distance of 100 ft.

**RICHMOND CONSOLIDATED.**—The Manager, under date of February 6, reports as follows: We are now pushing ahead with underlie, so as to convey air to bottom of shaft. When this is done we shall drive north and south along the reefs. We have not yet got tanks for storage of water, as there is the greatest difficulty in getting things up the track, and unless rain falls it will again be serious both as regards the health of the population and the difficulty of carrying on operations. I think the English companies, as a whole, ought to mention at all times the benefits to be derived by workmen on the gold fields of Western Australia—high wages, British rule, &c. Unless this is done, and a greater influx of labour takes place, wages will rise too high. No sooner do men get into the place, than they are absorbed. This should not be lost sight of.

**AFRICAN ALLUVIAL.**—Report from Mr. Ninnes, dated February 1, 1896: The flood-race has been completed from the Revue River to the point in the Zambesi, where I intend to commence paddocking or sluicing pay alluvial. It is my intention, after we have sluiced pay alluvial up the river bed, to get sufficient fall, to commence "ground sluicing"—i.e., sluicing on the ground without boxes; by this means we can get the greatest quantity possible of wash through in a day, and thereby undoubtedly make handsome profits. The delay in sluicing pay alluvial has been a source of great anxiety to me.

**CHAMPION REEF.**—Fortnightly report of Captain James Rowe, Superintendent, dated February 24: Dallyell's shaft.—This shaft has been sunk 8 feet, total depth below the 840 feet level, 14 feet. Lode 4 feet wide, assaying 1 ounce 9 dwts. 14 grains of gold per ton. Two stopes are being worked in back of 620 south, average width of lode 2 feet 9 inches, average assay value 1 ounce 10 dwts. of gold per ton.—Garland's shaft.—This shaft has been sunk 11 feet, total depth 1,030 feet, 6 inches. Lode 1 foot 6 inches wide, assaying 1 ounce 19 dwts. 14 grains of gold per ton. The 940 feet level north has been driven 25 feet 3 inches, total length 415 feet. Lode 4 feet wide, assaying 1 ounce 13 dwts. 20 grains of gold per ton. No. 2 rise in back of level risen 16 feet 3 inches, total height 92 feet 9 inches. This is communicated with 840 north. No. 3 new rise (120 feet north of No. 2) risen 4 feet. Lode 6 feet wide, assaying 1 ounce 8 dwts. 7 grains of gold per ton. Stope above level south of No. 1 rise, lode 24 feet, assaying 1 ounce 9 dwts. 20 grains of gold per ton. The 940 south driven 21 feet 6 inches, total length 344 feet. Lode 3 feet wide, assaying 1 ounce 14 grains of gold per ton. The 840 feet level north has been driven 18 feet, total length 789 feet 9 inches. Lode split up into small branches of quartz, assaying 16 dwts. 12 grains of gold per ton. Stope in back of this level north of No. 4 rise. Lode 2 feet, assaying 1 ounce 19 dwts. 4 grains of gold per ton. The 740 north driven 27 feet 6 inches, total length 1,035 feet 9 inches. Lode 3 feet wide, assaying 2 ounces 4 dwts. 20 grains of gold per ton. No. 7 rise above level risen 8 feet 3 inches, total height 37 feet, lode 1 foot 6 inches wide, assaying 18 dwt. 8 grains of gold per ton. Six stopes in back of level, average width of lode 3½ feet, average assay value 1 ounce 10 dwts. 20 grains of gold per ton. Stope above 630 North, lode 3½ feet wide, assaying 1 ounce 11 dwts. 8 grains of gold per ton. Four stopes below 630 North, average width of lode 4 feet, average assay value 1 ounce 13 dwts. of gold per ton. Seven stopes in back of 530 North, average width of lode 4 feet 9 inches, average assay value 1 ounce 10 dwts. 12 grains of gold per ton. Stope above 530 south of west cross-cut, lode 3 feet wide, assaying 17 dwts. 10 grains of gold per ton. Six stopes in back of 440 north, average width of lode 3 feet 10 inches, average assay value 1 ounce 7 dwts. 17 grains of gold per ton. Stope below 440 south of west cross-cut, lode 4 feet wide, assaying 1 ounce 6 dwts. 3 grains of gold per ton. Two stopes above 340 north, average width of lode 4½ feet, average assay value 1 ounce 15 dwts. of gold per ton. Four stopes below 340 north, average width of lode 5 feet, average assay value 1 ounce 8 dwts. 20 grains of gold per ton. Stope below 340 south of west cross-cut, lode 1 foot 6 inches wide, assaying 1 ounce 12 dwts. 14 grains of gold per ton. Stope above 240, north of west cross-cut, lode 2 feet wide, assaying 1 ounce 15 dwts. 8 grains. Stope below 240, south of west cross-cut, lode 2½ feet wide, assaying 1 ounce 12 dwts. 16 grains of gold per ton.—Ribble's Shaft: This shaft has been sunk 6 feet—total depth 711 feet 3 inches. The lode is still small and without value, on account of the



hanging side being heavy, and our having to put in timber to secure same, the sinking has been slow. The 640 feet level north has been driven 19 feet, total length 362 feet. Lodes 1 foot wide, assaying 1 ounce 6 dwts. 12 grains of gold per ton. The 640 feet level south of east crosscut, south of shaft, has been driven 25 feet 6 inches, total length 185 feet. Lode 1 foot 6 inches wide, assaying 1 ounce 12 dwts. 12 grains of gold per ton. Winze below 540 south of east crosscut, south of shaft, sunk 2 feet 6 inches, total depth 4 feet 6 inches. Lode 2 feet wide, assaying 18 dwts. 6 grains of gold per ton. Stope in back of 640 south of east crosscut. Lode 3 feet wide, assaying 1 ounce 5 dwts. 5 grains of gold per ton. Five stopes in back of 540, south of east crosscut, average width of lode 3 feet, average assay value 1 ounce 5 dwts. 6 grains of gold per ton. Three stopes in back of 440 south of east crosscut, average width of lode 4 feet, average assay value 1 ounce 4 dwts. of gold per ton. Two stopes in back of 340 south, average width of lode 3 feet 9 inches, average assay value 1 ounce 3 dwts. 11 grains of gold per ton. Stope below 340 south. Lode 6 feet wide, assaying 1 ounce 8 dwts. 20 grains of gold per ton. Stope in back of 340 north. Lode 5 feet wide, assaying 1 ounce 6 dwts. 12 grains of gold per ton. Stope in back of 340 north on fold. Lode 10 feet wide, assaying 1 ounce 15 dwts. 17 grains of gold per ton. Stope in bottom of 240 north of shaft. Lode 4½ feet wide, assaying 19 dwts. 14 grains of gold per ton. Five stopes in back of 240 south, average width of lode 4 feet, average assay value 1 ounce 8 dwts. 9 grains of gold per ton.—Carmichael's shaft: This has been sunk 8 feet 3 inches; total depth below the 540 feet level, 85 feet. West part of lode on which shaft is sunk is 6 inches wide, assaying 1 ounce 2 dwts. 16 grains of gold per ton. The 440 feet level north of crosscut, east of shaft, driven 15 feet 3 inches; total length, 98 feet. Lode 6 inches wide, assaying 11 dwts. 17 grains of gold per ton. Three stopes in back of 540 north of east crosscut; average width of lode, 4½ feet; average assay value, 1 ounce 13 dwts. of gold per ton. Stope in back of 540 north of shaft, on middle part of fold; lode 3½ feet wide, assaying 2 ozs. 5 dwts. 17 grs. of gold per ton. Two stopes below 440 south of shaft; average width, of lode 2½ feet, average assay value 1 ounce 9 dwts. 6 grains of gold per ton.—Rowe's Shaft. The 615 feet level north of shaft has been driven 10 feet, total length 13 feet. Lode 2 feet wide, assaying 1 ounce 15 dwts. 14 grains of gold per ton. The 615 south of shaft, driven 26 feet, total length 50 feet. Lode 2 feet wide, assaying 2 ounces 3 dwts. of gold per ton. Stope below 415 south. Lode 1 foot 6 inches, assaying 2 ounces 5 dwts. 17 grains of gold per ton. Stope in back of 315 north. Lode 2½ feet, assaying 1 ounce 16 dwts. 12 grains of gold per ton. Two stopes below 225 south. Average width of lode 3 feet 6 inches, average assay value 1 ounce 4 dwts. of gold per ton.—New Vertical Shaft. This shaft has been sunk 15 feet 3 inches, total depth 89 feet 3 inches. The strata, which is composed of dyke and schistose rock, is still hard and spare for sinking through. We are now sinking with two rock drills, and in a few days shall put another on.—Cyanide Works. The masons are busily engaged about the necessary foundations and buildings for this plant.

**GELDENHUIS ESTATE & GOLD.**—Summary of operations for January 1896; Quartz mined, 8,440 tons of 2,000 lbs.; quartz milled (120 heads), 7,257 tons of 2,000 lbs.; yielding smelted gold, 1,345.88 ozs. valued at £4,670 18s.; tailings, treated, 4,261 tons 927.15 ozs.; concentrates treated, 160 tons 158 ozs., £2,534 6s.; total, 2,431.03 ozs. at £7,205 4s. Cost, £8,156 4s. 4d. Mining and hauling, 11s. 10.39d.; transport, 8d.; milling, 3s. 8.39d.; general maintenance, 3s. 9.51d., total, 20s. 0.29d.; charges, 8.89d., 20s. 9.18d.; expended on mine development, 4s. 10.88d., 25s. 8.06d., £1,780 12s. 6d.; cost of producing and treating concentrates, £191 8s. 5d.; cost of treating tailings, £791 17s. 6d., £10,920 2s. 9d.; loss for the month, £3,714 18s. 9d.; capital account: expended on machinery, new shafts, &c., £1,009 3s. 11d. Number of feet driven and sunk during month, 3,944 feet. The ore developed for the month amounted to 7,631 tons. Owing to the recent unsettled state of affairs and scarcity of native labour, the mill ran only 13½ days. The loss incurred on operations and high cost is due to the stoppage in the early part of the month, during which time the salaries of portion of the white employees, and the whole of native wages continued, and was charged on the small amount mined and milled.

**GREAT BOULDER PERSEVERANCE.**—Mining report for fortnight ended January 31st 1896: No. 3 Shaft. This shaft has been cut down to full size from the brace—viz., 10 feet by 4 feet in the clear, and when sawn timber can be procured we intend to continue sinking until a sufficient supply of water to keep condenser going is struck.—No. 6 Shaft. The lode in this shaft has been followed S.W. on the underlay for a distance of 14 feet for the fortnight. At this point the lode took a perpendicular dip, and on this account we think it advisable to sink the shaft another 20 feet, then cross-cut for the lode, and when cut drive North on course of it. Prospects are about the same as in last report.—No. 7 Shaft. This has been sunk a further distance of 6 feet for the fortnight, making the total depth from brace 49 feet 6 inches. Have timbered up 12 feet and put in ladder way. The ground is improving for sinking, but there is no other change to report.

**LINDSAY'S EXTENDED (EAST).**—Progress report for the eight weeks ending 6th February 1896: Owing to my absence on leave, one four weeks' report has been missed; the present one, therefore, comprises eight weeks. During that period we have sunk 18 feet, driven 17 feet. The sinking of the No. 2 underlay shaft has been steadily continued, and it is now 176 feet deep on the reef. Progress has been slow owing to delays caused by baling water, and through the distance this has now to be hauled by a horse. A saving both of time and labour could be effected here by providing a small boiler and steam winding winch. The reef at bottom of shaft is now about 5 feet thick, and is heavily charged with pyrites. The supply of water is intermittent, ranging from 500 to 1,300 gallons per day; but deeper sinking will soon make an improvement in this respect. In No. 1 underlay shaft we are prospecting what appears to be lode formation. This can be traced southward along the surface for some distance. Recently, at the point where work is in hand, we find that the lode is carrying gold, though not at present in payable quantities. I intend to prospect this formation thoroughly by sinking on it at various points, and hope to find that it contains gold in payable quantities. I am preparing to treat some of the lode material from No. 2 shaft in the Lindsay Company's Dry Crushing Plant. Being soft material, I may meet with more success in dealing with it than has been the case when treating the hard quartz; I shall be able to give you the results of the test in my next report.—E. Davenport Cleland.

**MENZIES MINING & EXPLORATION.**—Cabled reports for three weeks, ending 12th March: Sinking and driving progress 226 feet; total, 1,572 feet. Shirez, south shaft, 59 feet, 3 ounces per ton; west shaft, 99 feet, 2 ounces 8 dwts. per ton. Aspasia, west shaft, 25 feet, 3 ounces 13 dwts. per ton. Isabel, completed timbering shaft. Working on 34 feet level, driven 36 feet in face of drive 7 ounces 4 dwts. Lady Shenton extended, shaft M, 82 feet level 2 feet 6 inches, 46 ounces; shaft N, 112 feet, lode 2 feet, 19 dwts.

**MOUNT ZEEHAN (TASMANIA).**—Manager reports for week ended 31st January 1896: No. 8 lode, main shaft, intermediate level, extended 11 feet; total, 22 feet 6 inches. Ore produced, 2 tons first, and a few tons good seconds. Lode in face is disordered, owing to crosscourse also met with at No. 1 level. Concentrator has been kept running on ore from tributaries and Zeehan—Montana Co.

**NEW SPES BONA.**—The Johannesburg Consolidated Investment Company announce receipt of a report from the above Company containing the following: During the week ending 18th February, various improvements and alterations in the main shaft, &c., prevented great progress in development, but work will be advanced considerably at an early date. New engine is working smoothly, and air drills are being put down on third level, and the fourth level will soon be supplied with similar appliances, which will push ahead development. On opening up the fourth level, Manager estimates that he will have 100,000 tons of ore developed. Construction of large dam is well in hand. Gates crusher has arrived, and the erection of the head gear will shortly be commenced.

**WORLD'S TREASURE.**—Dunnville, Jan. 31st 1896. During the past week the south shaft has been sunk a further depth of 6 feet; total depth at present, 62 feet (on underlie). The lode has increased 6 inches in thickness, at present being 2 feet 6 inches wide. At the north shaft have sunk 6 feet for the week; present depth of the underlie, 17 feet. The reef in this shaft has increased 12 feet in thickness, and is dipping much more vertically.

**ALAMILLOS.**—Mine report dated March 11: In the 40 fathom level driving east of Santa Agueda's shaft the lode is regular and well formed, valued at 1½ ton per fathom. The 70 east of San Felipe's crosscut turns out some good stones of ore, estimated at ¼ ton per fathom. In the 85 west of Taylor's engine shaft the lode is rather unsettled, its present worth being ¼ ton per fathom. In the 150 west of the same shaft the lode is unproductive. Guillermo's winze, sinking below the 40 fathom level, has been suspended. The lode is poor. Hermann's winze below the 60 is being sunk, the lode being rather small, valued at ¼ ton per fathom. Marquis's winze below the 100 the lode is regular and well defined, estimated at 1½ ton per fathom. Dian rises in the back of the 100 is going up through splendid ore ground, valued at 4 tons per fathom. The stopes continue to yield well. Surface works are kept on very regularly, and the machinery is in good working order. Estimated raisings for March 200 tons. The tributers returned 44½ tons of mineral in the past month.

**BREMENES.**—The following report has been received from the mine dated Huesund, March 12: Rising Mine. The men driving the 403 feet level have advanced during the week nearly 30 feet. The quartz in end is over 5 feet wide, contains a little galena, and has shown gold by panning. The 300 north level has a quartz lode about a foot in width of improving value. The 200 feet level driving south is without material alteration; the lode varies in width from 15 inches to 2 feet in width, composed of quartz, mixed with slate. Some improvement is seen in the 100 feet south level, where the quartz at present holds a width of nearly 1 foot, contains a little copper and iron pyrites, and is improving.—Glasgow Mine. The level driving north from bottom of shaft carries 10 inches of quartz, containing a quantity of galena. Several stones taken from this working have shown gold by panning. The stopes working in back of upper level continues to produce quartz of good quality. The lode holds a width of nearly 2 feet, contains galena and copper pyrites and shows gold.—Fladen's lode. The winze in open cutting shows quartz in bottom over 6 feet in width of excellent quality. We are now about 40 feet below level cutting. Six men have commenced to drive south from shaft, with intention of communicating with above winze. The distance to drive is about 130 feet. We started hauling from this mine yesterday.

**GWANDA (RHODESIA).**—Managers report for the period ending Jan. 23: Umthobane reef, shaft 1. Total depth to date 58 feet. No. 2 shaft, total depth to date 74 feet. No. 3 shaft, total depth to date 87 feet. Average size of the reef 18 inches.—Lady reef, drive 1. Total vein to date 10 feet. Driving crosscut we have cut through another small vein carrying gold. Tuli River reef. No work has been done during the past fortnight on this property. The manager writes that he expects a first gang of 50 boys this week from Tuli, and he will then be able to do some good work. The boys from there have been working in Johannesburg; their contract time is three months. The authorities are now busy with the redistribution of cattle to the natives, and cannot promise a labour supply before next month. He is keeping this question constantly before him, and he hopes to organise a regular supply of labour.

**GREAT BUNYONG.**—February 10: Retimbering quartz shaft actively carried out without material obstacle having been encountered. I hope to be under steam in about 10 days. Pending complete erection a mining shaft is engaged renewing timber where necessary, preparatory to bailing out the accumulated water with buckets of 70 gallon capacity. At the alluvial shaft all is progressing satisfactorily with the erecting of the machinery, and gives promise of completion at the time specified. Arrangements have been made for taking out the water with an 8 inch lift obtained under let and hire agreement.

**HANNAN'S STAR.**—The mines superintendent reports for the month of January follows: During this month the west shaft has been sunk 32 feet, the depth from the surface being 125 feet. A group of veins passed through during the first portion of time under notice was a deep water course, which was a spur coming in on the eastern side. The water mentioned in my last makes all in this decomposed ground, and its flow is about 450 gallons per 24 hours. I had expected to have obtained an increased quantity by further sinking, but no carrying the shaft down to its present depth, viz., 137 feet from surface I got into hard dolomite, which was dry, so I decided to come up and crosscut at the 120 feet level which is on the water bearing strata with a double object of proving the lode formation met with in the crosscut at 58 feet from surface, and also increasing the water supply. Before starting the crosscut the shaft was timbered up with close sawn timber for a distance of 14 feet, and a landing floor put in, and there has been a whip pole erected to haul the debris by horse power. The brace has been raised 4 feet by fresh logging. I hope to be able to report cutting the lode in my next report. The whole of this work is being carried on with three shifts of men. A crosscut has been commenced, and been driven 9 feet.—James shaft. The shaft was being completed to a depth of 80 feet when I last reported, the crosscut west has been commenced, and is now driven 38 feet. The ground passed through in variable hardness, but it appears that the drive is on the top of the hard blue dolomite and is being carried on in it and the overlying strata alternately. The lode found in the Boulder Main reef in coming south takes a slightly westerly direction from the time I set the shaft out. Consequently the crosscut will have to be driven further than was first anticipated, but I don't think it will be more than 100 to 125 feet.—General. I have got a condenser (locally made) on the ground, and shall condense all the water we raise from the west shaft and store it as soon as the plant is ready for work. I have storage already for 3600 gallons in six large galvanized iron tanks of 600 gallons each. These tanks have been made on the works. Have cut and brought in 20 cord of firewood, which ought to keep the condenser fire going some time. There is a lot of wood cut ready to draw in, and I shall eventually get a horse and dray, which will be employed exclusively for this purpose.

**KEMPINKOTE.**—Fortnightly report of Captain W. H. Williams, mine agent, dated February 24:—Girland's shaft, 500 main crosscut west has been driven 7 feet 8 inches, total distance from shaft 44 feet 9 inches. Lode in the end full size of the drive, assaying 1 dw. of gold per ton. 520 north drive has been driven 41 feet 8 inches, total distance from main crosscut 115 feet 6 inches. We are carrying the footwall and about 7 feet of the lode, assaying 12 grains of gold per ton. 500 south drive has been driven 31 feet 3 inches, total distance from main crosscut 130 feet 3 inches. Lode in the end about 2 feet wide, assaying 12 grains of gold per ton. 345 drive No. 1 crosscut west has been driven 8 feet, total distance from footwall 22 feet 6 inches. The lode driven through was rather poor. 20 feet from footwall the hanging wall was met with. The drive has been suspended, and the coals put to rest west cut at this level. 190 feet north of main crosscut, 245 drive No. 2 crosscut east bottom No. 2 winze has been driven 7 feet 3 inches, total distance 37 feet. Lode in the end full size of the drive assaying 12 grains of gold per ton. 345 south drive has been driven 26 feet, total distance from main crosscut 630 feet. Lode in the end 5 feet wide, assaying 1 dw. 2 grains of gold per ton. 113 north drive No. 1 crosscut west has been driven 12 feet 3 inches, total distance 24 feet. After passing through about 2 feet of schist the drive again entered lode. Lode in the end full size of the drive, assaying 12 grains of gold per ton. 183 south drive No. 2 crosscut east bottom No. 2 winze has been driven 24 feet, total distance 46 feet. Lode in the end full size of the drive, assaying 12 grains of gold per ton.—Henty's shaft. 341 north drive has been driven 14 feet, total distance 88 feet. Schist having been met with, the drive was stopped.

**LADY LOCH.**—The directors have received the following letter from Mr. F. O. Monger, local director of the company:—Mr. J. B. Read, the local secretary of your company, has informed me that you were desirous of hearing from me, and were anxious for my confirmation of the various reports which he has regularly conveyed to you. At the date of Mr. Monger's letter, the main shaft was 146 feet deep. In the prospecting shaft at the 100 feet level an easterly drive has been put in 208 feet, and a reef 2 feet wide has been gone through showing good 4 ounce stone. The west drive is now in 128 feet from shaft. The No. 2 prospecting shaft has been sunk to a depth of 70 feet, and a reef 2 feet thick has been struck showing stone estimated to yield 24 ounces. The total quantity of stone at grass is estimated at from 1400 to 1500 tons, and may safely be expected to yield about 5 ounces to the ton. The completion of the erection of the United Mines Ore Reduction Company's plant is nearly at an end, and I have every confidence in the results of the crushing that will go to this plant. In fact, I think that when machinery is on your property it will prove the Lady Loch to be the most valuable mine around Coolgardie, and one which cannot fail to give good and substantial dividends to the shareholders. The railway to Coolgardie will soon be completed, when the cost of material will be much reduced and greater facilities will be given for development at reduced prices.

**LINARES LEAD.**—Mine report dated March 11:—Poco Ancho Mine. Pellic's engine shaft. In the 100 fathom level the lode has improved in value, and is of a good size, estimated at ¼ ton per fathom. The 155 west of being now close to the boundary driving has been suspended.—Warne's crosscut. The lode in the 200 east is large, and turns out good lumps of ore, valued at ¼ ton per fathom. In the 200 west the lode is wide, but only contains a few stones of ore. The lode in the 178 west has improved to 1 ton per fathom, and looks kindly. No. 279 winze below the 155 fathom level has been temporarily suspended owing to a sudden influx of water. The lode was valued at 1 ton per fathom. The stopes continue to yield well. Surface works are kept on very regularly, and the machinery is in good working order. Estimated raisings for March 200 tons. The tributers returned 113½ tons of mineral in the past month.—Los Quinientos Mine. Taylor's engine shaft. In the 200 south the men are making good progress, though the ground is hard. The lode in the 185 east is unproductive. In the 165 east the lode is large and well defined, valued at ¼ ton per fathom. The lode in the 160 east continues regular, but only contains a few stones of ore. Castor's winze below the 165 fathom level is going down through a large well formed lode, valued at 1 ton per fathom. Estimated raisings for March 150 tons. The tributers returned 68½ tons of mineral in the past month.

**MOUNT LYLE MINING AND RAILWAY.**—Mine manager's report for week ending January 30: South drive, No. 3 tunnel. Distance driven for week 3 feet, total 559 feet. The only change of note is that wall appears to be making back again to the left.—South drive, No. 4 tunnel. This face has been driven 7 feet in pyrites of good quality, total 430 feet.—No. 5 tunnel, No. 2 crosscut. 2 feet driven, total 23 feet. Face still in very hard pyrites.—Progress for week ending January 31: Hauling line. Working only small force in terminal cutting removing side slips of ground.—Smelter building. Closing in ends of building, extending double trams over bins and into crushing building. &c.—Crusher building. Erecting bins and started slits of engine and sampling rooms.—Main chimney. Height above grade 146 feet, almost completed.—Babcock and Wilcox boilers. Brickwork in progress.—Hot blast stoves. Brickwork on front, side and rear walls fire-boxes and fire-bricks in progress.—Blast furnaces. Brick and ironwork of back in progress.—Blast house. Domes in progress.—Erecting smelter stack in progress.—Converter department. Brickwork of upper retaining wall and inside and outside flues in progress, excavating for hill flue to chimney, extending converter tram up east fork of Queen River for fuel.

**NO. 7 NORTH EAST QUEEN.**—The following fortnightly report has been received from the mine, dated Charters Towers, January 21:—During the fortnight Ferguson and party cleaned up 10 tons 10 dwts. of stone, crushed for 5 ounces 7 dwts. 13 grains smelted gold. They are at present driving back towards the shaft to meet Rich and party's level. The stone shows more mercury, Jordan and party gave up their block after the poor crushing recorded in my last report. Hamilton and party are still going on with their drive, and have about 12 inches of stone in the face of medium quality. Rich and party are still driving and stopping on a reef averaging about 16 inches of their usual quality stone. They anticipate putting through a crushing next week of about 35 tons or so. Wherry and party have a good face of stone in their leading stope just now, averaging about 30 inches for 20 feet long. They commenced crushing at the Defiance mill last Sunday night, but owing to the

weather are not yet through. By the truck measurement they should have about 34 tons to crush. Estimated haulage of quartz, 24 tons.—John T. Williams.

**RAYLEY'S REWARD NO. 1 SOUTH.**—The manager writes from the mine under date January 28: When the new boiler has been erected I shall have the whole of the fresh water expenses, excepting from 50 to 75 gallons per day. We intend erecting the boiler at the battery, and connecting with the machinery of the portable boiler and the exhaust with the present condenser; the amount of water condensed will be more than sufficient for the make of the engine boiler for which we are now buying condensed water. The make of the tubular boilers putting it out of the question to use salt water long. We are still crushing for the Coolgardie Consolidated, and I think will have no trouble in getting more from the other companies to go on with. The mine is looking well, and I expect to connect the rise in the 170 feet level with the winze above at the 120 feet in the course of this week. As soon as this passage is open we can commence sinking the main shaft again. To-day there is splendid coarse looking gold showing in the reef south end of rise. We have had gold, more or less, all the way up.

**ORIPAS.**—Mine report for fortnight ending January 31:—Santa Fe hill drift No. 3 driven 2 feet, total 171 feet; no change.—Santa Fe hill drift No. 2 crosscut west driven 42 feet, total 90 feet. In fair ore at a milling ore, assaying 7 dwts. 12 grains, silver 1 ounce 5 dwts. 12 grains, copper 88 per cent. We have been passing some 30 feet through this ore. We will try a sample of it when the 30 stamp mill is completed. It appears to be a very extensive deposit.—Francisco adit driven 22 feet; total 1 foot. Producing fair ore, assaying 5 dwts., silver 8 ounces 17 dwts., copper 436 per cent. This ore is running transversely across the drift, and if it connects with the San Juan deposit above, proves 50 feet of backs on the incline. We shall rise on this without delay, and when the opportunity presents itself shall prove it in its latitudinal directions.—Providencia Auer crosscut east driven 7 feet, total 57 feet. No change.—Santa Fe slope east crosscut driven 5 feet, total 26 feet. No change.—Providencia crosscut east No. 1 driven 17 feet, total 273 feet. No change. We are contemplating to remove the machine, working in this end, to rise on the ore in Francisco adit.—San Juan extension rise driven 6 feet, total 14 feet. Continuing to produce very good ore. Much of this ore is being bagged as picked ore.—San Francisco crosscut north-west driven 12 feet, total 24 feet. In fair ore assaying 6 dwts., silver 8 ounces 14 dwts., copper 410 per cent. This drift appears to be on the western extension of the San Juan ore course.—San Juan extension crosscut north-west driven 6 feet, total 26 feet. In low grade ore.—Taylor deep adit (open cut) driven 45 feet, total 45 feet. Surface deposit too deep to carry on open cut. Have to resort to timbering. It is our intention to put in sets of timber from the beginning, allowing the sides of the open cut to cave in on top of them.—Extraction. Old Providencia extracted 343 short tons, assaying 14 dwts. 12 grains gold, 6 ounces 12 grains silver, 429 per cent, copper. The ore is of below average quality, broken principally from bottom of stope.—Santa Fe stope extracted 97 tons. Santa Fe stope west. Ore is rather poor, assaying 1 dw. 12 grains gold, 1 ounce 19 dwts., silver, 91 per cent, copper. Santa Fe slope east. Ore is fair.—San Juan stope and drifts extracted 238 tons of very good ore. San Juan stope assays 12 dwts. gold, 19 ounces 11 dwts. silver, 937 per cent, copper.—Aver stope No. 1 communicated with Old Providencia, Assays 4 dwts. gold, silver 4 ounces 4 dwts., copper 241 per cent.

**CRAYEN'S CALEDONIA.**—The following fortnightly report has been received from the mine, dated Charters Towers, January 31:—In the underhand stope the reef is about the same as last reported, and in the two stopes in the end of the crosscut the reef is about 10 inches, and in the other stope the reef averages about 5 inches. In the two stopes in the hanging wall the reef averages about 6 inches. The reef has been extended a further distance of 6 feet, making total 167 feet from the starting point. At this distance I have holed through into the stope, and this will open up another block of ground in this part of the mine.—Hooper and party. The reef in their stope averages from 3 to 6 inches of fair quality, and they have about 25 tons of stone broken.—Bower and party have extended No. 5 level a further distance of 3 feet, making a total of 32 feet from the starting point, and the reef in this level is about the same as last reported. They have got 23 tons of stone broken.—Hooper and party have extended No. 4 level a further distance of 1 foot, making a total of 5 feet from the starting point. At this distance I have got about 14 tons of stone broken.—Slade and party. In the underhand stope No. 6 level, have got about 7 tons of stone broken.—Johnson and party have started their tribute between Nos. 6 and 7 on the 27th inst. The haulage of quartz for the company for this fortnight is about 27 tons, making a total of 74 tons in the paddock.—G. Cabassi.

**FORTUNA.**—Mine report dated March 11: Canada Innes' Mine. In the 110 fathom level driving west of San Pedro's shaft the lode is larger and looks promising, valued at ¼ ton per fathom.—Los Salidos Mine. The lode in the 112 east of Taylor's engine shaft has improved to 1 ton per fathom. In the 107 east of the same shaft the lode is only slightly mineralised. The lode in the 92 west of Palgrave's shaft continues regular, but is rather small. Granero's winze sinking below the 200 has holed to the 112 fathom level. The stopes continue to yield well. Surface works are kept on very regularly, and the machinery is in good working order. Estimated raisings for March 225 tons. The tributers returned 81 tons of mineral in the past month.

**GENE OF CUE.**—Manager's report for month of January.—I have to report that the mine has been delayed during the last fortnight by a slight accident to the pumping gear, which stopped operations underground and allowed the water to rise in the drives. Beyond the delay the accident caused very little damage above or below. The drives have been cleaned up and contractors have extended the north-west deep level 14 feet. In the rise the wash dirt is again being operated on, and this morning a crosscut to further open up the wash has been started. It will take several days more before a machine full of wash will be ready for sluicing. The drive is mainly in the bedrock at present.

**MOUNT MAGNET.**—The fortnightly report received from the general manager, dated February 3, states:—During the past week I called for tenders for the sinking of a mullock pass on course of reef from surface (midway between the main shaft and No. 1 north shaft) to the 60 feet level. The tenders varied in price from 50s. to 15s. per foot. The latter price was accepted. The pass is now down 7 feet. Reef 15 inches wide, yielding all 2 ounce stone. We have cut through the auriferous dyke at the 61 feet level from No. 1 shaft north, proving it to be 15 feet wide at this point. Of course I do not say that it will assay 25 dwts. for the whole width, but the portion formerly on with 5 feet—will. The lode body must be put through the battery in bulk, as the whole mass is permeated with the precious metal. There is no material change at any of the other points of operations.

**MURCHISON UNITED GOLD MINES.**—The mine superintendent reports for the month of January that the vertical shaft in the Lily Mine, to which development is at the present time limited, has been sunk during the month 23 feet, making it a total depth of 172 feet 6 inches. The granite in which the shaft is being sunk is very hard, and in consequence progress has been slow. Added to this the new year's holidays interfered with work; the demand for miners being so great, the men obtainable are not of the most experienced and best sort. All possible dispatch is being used under the circumstances. As previously intimated cable advices of February gave the depth of the shaft as 181 feet, and a cablegram received March 9 states that a crosscut for the lode from the shaft has been commenced, and that the winze from the 100 feet level is being continued.

## STATISTICS RELATING TO COPPER.

FROM THE CIRCULAR OF  
MESSRS. ARON HIRSCH AND SON.

[SPECIALLY TRANSLATED FOR The Mining Journal.]

(Continued from page 332.)

HALBERSTADT, FEBRUARY, 1896.

THE mines represented by the European Producers' Committee increased the figure of their production for 1894 without, however, attaining again, in 1895, the preceding year's figure. Now, if we add the increase of production, amounting to 10,581 tons, which results from the addition of the figures published for 1895 by the two groups of producers to the figures representing the world's production for 1894, equal to 324,405 tons, we think we are justified, on the basis of the figure of 334,986 tons resulting therefrom, in estimating the maximum world's production for 1895 at 340,000 tons. In 1893 the world's production amounted to 303,975 tons; in 1894, the plus (excess) in the figures representing the production given by the European Producers' Committee and the American Associated Companies amounted to 19,374 tons, and the total of these figures of 323,349 tons is exceeded by the actual figure of production only by about 1000 tons. We, therefore, believe we have correctly estimated the maximum figure of the world's production for 1895 at 340,000 tons, by leaving for 1895 a margin of 5014 tons for the increase of the production not belonging to these two groups, and which in the preceding year amounted only to about 1000 tons. This figure is likely to be all the less exceeded, as the already known increase in the production of some of the mines in Chili and Australia not represented in the two groups is, no doubt,



neutralised by a decrease in the production of other localities of production of the world. The two groups frequently alluded to above represent 70 per cent. of the copper production of the world.

In North America the production was :-	1894.					1895.				
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Indigenous ores	128,175	134,738	145,184	149,738	157,820	145,090	12,730	157,820	177,433	180,387
Imports	6,663	43,600	4,554	40,195	15,000	12,730	157,820	177,433	180,387	180,387
American consumption of copper	...	...	...	...	...	...	...	...	...	...
Exports to Europe	...	...	...	...	...	...	...	...	...	...
Stocks in America at the close of the year (4)	...	...	...	...	...	...	...	...	...	...
According to later statements the stocks at the close of the year were (6)	...	...	...	...	...	...	...	...	...	...
(2) This figure is composed of :-										
The figure stated by the American Associated Companies...										
Pyrites and other sources										
Imports, according to Messrs. James Lewis and Sons' statement (Circular for 1894) ...										

(3) We calculate this as follows :-

	1894.	1895.
Production and imports ...	168,641	175,487
Exports, as per Statement of W. A. Companies ...	77,130	63,935
Decrease of Stock in 1894	91,511	111,552
" " 1895	3,000	3,552
	94,511	108,000

The consumption for 1894 is in accordance with statements we have lately received, composed as follows :-

	Tons.
Consumption for 1st half-year	42,000
" 2nd "	52,511
	94,511

For 1895 we do not yet possess the necessary figures for ascertaining the shape which the consumption has taken in each half year, but, no doubt, at the commencement of spring a brisk movement set in, which increased continually until the autumn.

(4) According to Messrs. James Lewis and Sons' statement for the previous year.

(5) We have constructed this figure on the basis of Messrs. Lewis' statement, assuming an increase of stock in America of about 300 tons, in accordance with the statements published by the same English statisticians for 1895.

(6) Made by Messrs. Lewis, in concert with the information obtained from the New York Metal Exchange. It is a most regrettable fact that the American statements relating to stocks should be as little reliable, as they sound mysteriously. This fact is explained by the practice obtaining in America of registering the raw material warehoused in mines, refining works, and electrification establishments, as also those in transit to export seaports, and on their way to home consumers, in the same manner as stocks, as is done in the case of copper lying in warehouses. A striking instance of the remarkable difference that exists between American valuations among themselves occurs in the annual report of Messrs. Houston and Co., of New York, in which are set down for 1895 a decrease in stocks of 9903 tons, and a consumption of 118,303 tons. It would be most desirable that this state of matters might be dealt with in a better manner. North American producers should, in their interest, be anxious to publish monthly, in a clear manner, their figures of production and stock on hand, because, owing to the contradictory statements sent from the other side of the Atlantic to Europe, the parties interested in them in Europe are disturbed and misled.

The European figures relating to imports from North America are, according to Merton's tables, as follows :-1893, 77,414 tons; 1894, 71,380 tons; 1895, 55,401 tons; hence they are considerably lower than the figures reported from America as representing the exports to Europe. According to the monthly tables 23,781 tons, out of these 55,401 tons are distributed over London, Liverpool

Swansea, and Havre, whereas the statistics of the English Board of Trade for 1895 register, as imported from North America :-

849 tons ore at 25 per cent. ...	212 tons
15,159 tons regulus at 55 per cent. ...	8,338 "
Copper ...	12,500 "

Total ... 21,050 tons  
and the French Official Statistics show the imports from the United States to Havre amounted in 1895 to ... 11,157 "

Grand total ... 32,207 tons  
Which gives a surplus over Merton's figures of ... 8,426 "

It is, however, true that the latter does not include for Great Britain Hull, Newcastle, Glasgow, &c., and for France, Bordeaux and Marseilles. Neither the consideration of this circumstance nor the reflection that the terms—Export to and Import from a country—do not agree precisely in one and the same calendar year (because of the quantities afloat at the commencement and the end of the same year) can be looked upon as a sufficient explanation of the deviation, nor can, in the same manner, the supposition of transit parcels from Mexico or Canada having been declared in North America as exports, suffice for a foundation of such a difference. We believe that the statement of the New York Metal Exchange Annual Review sets down correctly the exports to England for 1895 as 10,628 tons raw copper, and 73 per cent. tons fine copper in copper metal (13,390 tons, at about 55 per cent.), equal to 17,998 tons, and the exports to France as 11,668 tons raw copper, and 137 tons fine copper metal, equal to 11,805 tons; total, 29,803 tons.

The proportion of production in the several American districts was as follows :-

	1894.	1895.
Arizona ...	19,880	21,429
Michigan (Lake) ...	51,128	58,036
Montana (including Anaconda) ...	81,739	82,589
Other States ...	5,067	10,246
	157,814	172,300

The foregoing figures bear witness to the rapid development which characterises North America. In 1882 the figures were: Production, 40,990 tons; consumption, 38,202 tons; export, 2788 tons. In 1893 the consumption has been materially restricted under the influence of the crisis prevailing in America. In 1894 the after-effects of that crisis were still felt; even in 1895, with a considerably increased consumption of 108,000 tons, the figure of 118,472 for 1892 was not again reached.

At the same time it must be borne in mind that for electrical purposes the consumption was greater in 1894 and 1895 than it had been in 1892. The short out-turn is due to the reserve displayed in making purchases for railway plant, which had been limited to its lowest expression, and to the depressed state of the brass industry. It is believed, however, that the railways, which now can boast of better working results, cannot much longer postpone making large purchases, and that the brass industry will soon develop a regular and important demand; in that case the figure representing the consumption in 1892 will, in view of the great supplies required for electrical purposes, and of the increase in naval construction, not only be again attained, but also exceeded.

	1894.	1895.
Indigenous ores	128,175	134,738
Imports	6,663	43,600
American consumption of copper	...	...
Exports to Europe	...	...
Stocks in America at the close of the year (4)	...	...
According to later statements the stocks at the close of the year were (6)	...	...
(2) This figure is composed of :-		
The figure stated by the American Associated Companies...		
Pyrites and other sources		
Imports, according to Messrs. James Lewis and Sons' statement (Circular for 1894) ...		

	1894.	1895.
Indigenous ores	128,175	134,738
Imports	6,663	43,600
American consumption of copper	...	...
Exports to Europe	...	...
Stocks in America at the close of the year (4)	...	...
According to later statements the stocks at the close of the year were (6)	...	...
(2) This figure is composed of :-		
The figure stated by the American Associated Companies...		
Pyrites and other sources		
Imports, according to Messrs. James Lewis and Sons' statement (Circular for 1894) ...		

With regard to FRANCE, we subjoin the following particulars :-

According to Lewis' Tables the French consumption of raw copper has been ascertained to be in—

	1891.	1892.	1893.	1894.	1895.
Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
31,137	24,928	36,142	26,879	30,658	

consequently Germany has excelled very greatly over this country. According to French statistics, the export of copper manufactures amounted to—

	1891.	1892.	1893.	1894.	1895.
Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
7,173	6,726	7,064	4,624	6,952	

consequently it is much smaller than that of Germany. The imports of manufactures into France amount, for the same years to—

	1891.	1892.	1893.	1894.	1895.
Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
744	928	619	537	431	

(1) In England, half monthly reports are published on the stocks extant in public warehouses. These stocks consisted :-

	January 1st, 1891,	December 31st, 1891,	January 1st, 1892,	December 31st, 1892,	January 1st, 1893,	December 31st, 1893,
Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
40,015	43,863	47,663	40,000	49,478	41,528	21,492, 8781, 3080,

The French stocks were, on the same days: 21,492, 8781, 3080, 2745, 1286, and 1389 tons. The total stock in England and France has accordingly decreased from

	January 1st, 1891,	December 31, 1893,
Tons.	Tons.	Tons.
61,507	42,745	

and rose again by receding once more on " 31, 1894, to 50,764 " " 31, 1895, to 42,917 "

The German stocks extant in public warehouses, are, as a rule, not so considerable as to constitute a factor in statistics; moreover, the necessary particulars are not forthcoming. In the case of the French warehouses, also, statistics are kept up only as a matter of habit, as the stocks there are, as in Germany, unimportant. The small stocks—1389 tons on the last occasion—have lost all importance for the market, all the more so as a speculative market no longer exists in France.

We ascertained the figure representing the English consumption to be as follows :-

	1894.	1895.
Tons.	Tons.	Tons.
Imports ...	125,009	119,944
Production in Cornwall ...	488	791
Less increase in stocks ...	125,497	120,732
Less export ...	9,478	7,950
	116,019	128,682
	54,689	66,089
	61,330	62,593

Although the French statistics, which are drawn up on a principle (system) different from the one underlying the German, do not admit of any absolute comparison, the latter, nevertheless, gives an idea of the proportion in which the consumption takes place.

The importation of raw copper into France took place in the following proportions :-

	1891.	1892.	1893.	1894.	1895.
Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Direct importation ..	14,889	9,374	25,579	19,653	22,692
Imports from and via England ...	10,193	14,850	5,632	5,932	7,966
Total ...	25,082	24,224	31,211	25,585	30,658

In the foregoing statements for England and France we are guided by Messrs. James Lewis and Sons, of Liverpool, who are generally acknowledged to be reliable statisticians.

And here we may not fail to mention that the Official French Statistics show a somewhat different system of grouping, and the final result they give does not entirely agree with the figures set down by Messrs. Lewis for France.

The French Official Statistics for the years show :-

	1893.	1894.	1895.
Tons.	Tons.	Tons.	Tons.
Imports of Raw Copper...	30,398	28,654	34,618
Less Exports ...	7,019	5,822	4,910
Old Metals (excess Imports over Exports ...	23,379	23,332	29,708
Excess of Imports of Raw Material ...	2,892	2,411	4,644
	26,271	25,743	34,362

The French statistics give also the following particulars :-

	1893.	1894.	1895.
Tons.	Tons.	Tons.	Tons.
Imports of Ores ...	20,543	11,643	10,448
Less Exports ...	10,214	5,021	1,771
Excess of Imports over Exports	10,329	6,622	8,677
Home Consumption ...			

In our opinion these quantities represent principally material of high percentage, such as Corro ores and Boleo ores. In the French statistics their value is set down at about 85 francs per 100 kgs. ore, which would correspond to a copper percentage of about 90 per cent. We, however, think it right to say that this valuation of the percentage is too high, and, therefore, decrease the copper percentage on an average to 70 per cent. Adding the consumption of copper produced from these ores to the figures already ascertained as representing the consumption of raw material, thus :-

	1893.	1894.	1895.
Tons.	Tons.	Tons.	Tons.
Raw Material ...	26,271	25,743	34,532
10,329 Tons Ore at 70 %	7,229	4,635	8,657
We obtain a consumption of ...	33,501	30,378	43,189
To which add decrease in stocks ...	355	1,459	103
Giving a total consumption of ...	33,856	31,837	43,292



We are in receipt of Messrs. Mathieson's Monthly Mining Handbook, which is specially interesting and valuable, as in addition to the usual information, it contains tables of West Australian crushing and other statistics useful to investors.



## MINING IN CORNWALL AND DEVON:

NOTES ON MINING IN THE WEST.

(FROM OUR SPECIAL CORRESPONDENT.)

PENDING the completion of the reconstruction schemes which are now in hand, there is very little doing in the share market. Dolcoaths are rather lightly held, and it is unlikely that there will be many transactions in these shares at present quotations. Wheal Grenvilles have been dealt in at 6½; this mine now occupies an enviable position compared with most other concerns in the county. Further progress is reported in connection with the Carn Brea and Tincroft scheme, and the shareholders will be called together before the date of the ordinary 16 weeks' meeting. The proposals to be submitted to the adventurers will provide for a nominal capital of £150,000. The existing shares in the two mines are to rank as of equal value, giving a total of £12,600. The committee recommend the issue of six new £1 shares for each of the present shares, the purchase money to exist in the acknowledgment of 10s. having been paid on each share. Thus, for the 12,600 shares 75,600 new £1 shares will be issued, on which the present shareholders will have a liability of £37,000. Mr. C. V. Thomas intimated at the last meeting that those who have contributed so largely, and at small profit to themselves to the development of the mine, will be allowed a little breathing time, and this will be effected by making it a condition that the liability of 10s. on the vendors' shares shall not be called up until after the new capital has been expended. The scheme generally meets with approval, and it is to be hoped that there will be no unnecessary delay in holding the meeting.

THERE has been further correspondence between Mr. R. L. Hattersley and Mr. J. R. Branwell, but it does not advance matters much. Mr. Branwell is still anxious that the whole of the matters in dispute should be laid before impartial arbitrators, and asks Mr. Hattersley to lay this proposition before his shareholders. Mr. Hattersley prefers his own solution, and so the deadlock continues. In the meantime a diversion has been effected by Mr. Strauss, M.P., on whose information Mr. Cornelius Bawden, the pursuer of Wheal Agar, was on Tuesday summoned before the county magistrates, at Camborne, for failing, contrary to the provisions of the Stannaries' Act, to convene an ordinary meeting of shareholders "at least once in every 16 weeks." Mr. Bawden practically admitted the offence, but pointed out that, although the last meeting, at which accounts were presented, was held on October 8, there was a general meeting on December 6, and that no fewer than eight meetings had been held during 15 months.

As the Chairman remarked, however, the Bench could not consider this fact; their duty was simply to say whether there had been a breach of the law, and this was not denied by Mr. Bawden. The Bench evidently did not wish to convict, and it is to be hoped that a meeting will be summoned before the date fixed for the adjourned hearing of the case in a fortnight's time. It is to be regretted that it should be necessary to take police court proceedings to ensure the calling together of the shareholders, but this latest incident in the wearisome dispute is quite of a piece with all that has gone before it.

### GWANDA (RHODESIA) CONSOLIDATED.

In a circular issued by the directors it is stated:—The company was registered on July 26, 1895, with a capital of £100,000, in 100,000 shares of £1 each, 40,000 of which were allotted to the vendors in part payment of the £80,000 payable for the properties acquired, the remaining 60,000 shares being allotted to the public. At the time of the issue the shares were very largely over-subscribed, and we were, therefore, able to draw together a very large and influential body of shareholders. The number of applicants for shares at the time of the flotation was 804, but the number of shareholders has been increased since then to over 1000. The company acquired 225 gold mining claims in Rhodesia, 200 of which are in the Gwanda gold mining district 70 miles south of Bulawayo, and 25 in the Umzingwane district, 15 miles south of Bulawayo, described in the prospectus of the company. A mining claim in Rhodesia measures 150 feet along the reef and 600 feet across, and the law gives the holder the right to follow the dip of the reef to any depth, even though it goes outside the 600 feet limit. Immediately on obtaining transfer of the properties acquired by the company, the directors fully considered the general policy to be followed with regard to the development of the properties, and a scheme, which I have no doubt will meet with the approval of the shareholders, was formulated, the importance of which was impressed upon the local board and managers of the company in Rhodesia. Instructions were given that a judicious selection of the most important of the mining claims should be made for immediate development, that attention should be concentrated on them, and that work should be pushed ahead with the utmost dispatch, with the view of bringing the properties into a condition which would warrant the early flotation of subsidiary companies to work them for a profit. The above policy has been energetically followed, as will be seen from the report by Mr. Robert Simpson, mining engineer, Bulawayo, in whom Mr. H. B. Marshall, of Johannesburg, the Chairman of the local board of directors of this company, has great confidence. The managers of the company are of opinion that, when a little more development work has been done on some of the claims of the company, those claims will be ready for flotation. The directors have given instructions that this work be pushed ahead at once, and they hope that at an early date the manager's expectations will be realised. You will observe from the report that difficulties are being experienced through the want of native labour, but, as a result of railway construction and of measures taken by the British South Africa Company, this matter will right itself. I believe that every endeavour is being made to obtain for the company's properties a fair share of the labour obtainable. The directors of the company are fully alive to the importance of this matter, and instructions have been given to the managers in Rhodesia to peg out, where desirable, additional claims on behalf of the company. A proposal for the acquisition of an additional 140 mining claims and 50,000 morgen of land, equal to about 100,000 acres, is at present under the consideration of the directors.

MR. JOHN LOWLES, M.P., has left London for Australia, and besides being entrusted with an important mission to the various colonies on inter-imperial trade, he will visit the Limerick properties, of which company he is a director, and also the properties of the Yilgarn Exploring Company, the Coolgardie Consolidated Gold Mines and Scottish Westralia (Limited), as well as other centres in Western Australia.

The secretary of the ISLE OF MAN MINING COMPANY (LIMITED) sold 100 tons of this company's ore at £8 11s. per ton on Tuesday.

## WANTED.

\* Prepaid Advertisements are inserted in this column at the rate of 8d. per line, with a minimum charge of 4s.

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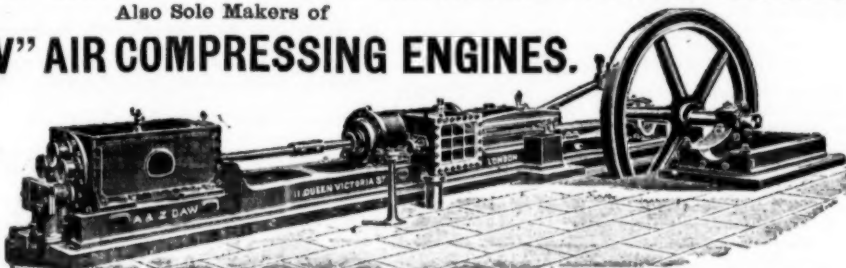
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Extracts and Notes from Mining Operations and Reports on these during the past 25 years.

By WILLIAM GUTHRIE BOWIE.

(Continued from page 348.)

MUCH, however, depends upon the preparation of the deposits of this raw ore, and many plans are adopted to secure the circulation of the air and vapours, as well as to facilitate the washing or leaching of such deposits. Some plans have been described years ago in *The Mining Journal*, one being conical deposits with pits or wells reaching from their bases to their truncated apexes, which, providing ventilation, exposes the greatest surface possible, while the wells or pits are filled with water and gradually leach to the surface; these, however, require some care in construction, otherwise the water will find channels and not bathe or wash all parts of the ore, as is also the case with the flat deposits. The best plan of all is to form large deposits, with plenty of artificially prepared air ways, and these should be as capacious as possible to prevent silting, such deposits being closed by a wall to act as a dam. The larger these can be made the better, and they can be made to contain from 10,000 tons to 200,000 tons of ore &c., according to the ground available, and the contour of the same. As ground is cheap, and the form of the hillocks and depressions around these mines is very favourable to form numerous such deposits, and the more of these the better. The prepared ore is tipped, and each deposit is flooded, and then the liquors leached or drawn out by syphons to the cementation tanks and canals; thus thorough washing is obtained, less silting than when poured on the top, and the rapidity with which each deposit can be flooded and again left dry is the greatest advantage of this plan, as ample time is provided to form sulphates before the successive turn of each deposit to be flooded again arrives. For instance, let there be 50 deposits, and that each can be flooded and emptied in ten days, then 500 days will elapse from the emptying of the first up to the time its turn comes to be flooded, or if 25 of these are flooded at once and the leaching lasts 250 days, then 250 days are available for the other 25 to form sulphates, and it happens that the climate of Spain in Andalusia is all that can be wished to facilitate this sulphatisation of the copper contents of the ore. While by this arrangement there is complete control over the liquors at all times to adjust them to the quantity of iron in use, or their strength in sulphate of copper, and the difficulty of heavy thunder storms, and losses of liquors by these and continual rains, are completely overcome, as the deposits can always be in a prepared condition to store more water than these can produce, and proper drainage around the deposits present, all entering except what actually falls on the surface of each deposit.

This plan is adopted in good style at Tharsis, and is being carried out at Lagunazo, Zarza, and other mines, and Rio Tinto is following on the same line, while other mines have been long using modifications of the above, but most depend upon flat heaps, and flooding alternately portions of their surface, which is never perfect, however much care is observed, as channels are made down through the masses by the water, and in time the mass becomes compact and parts impermeable; hence oxidation and washing of these parts become impossible.

To remedy such difficulties good results have been obtained by turning over such deposits of ore, and providing better ventilation and exposing new surfaces to atmospheric agencies. This will eventually be done with many of the old heaps of calcined ore, which are now fairly solid masses, and the plasticity and compactness of these is another evil of calcination, and the cause of delays in obtaining a little more copper from the same; but if turned over as stated, then the immense deposits of Tharsis and Rio Tinto are always important factors for the future by being treated as stated, which has been proved to be of great utility in other mines of the same class of ore, and similar deposits of this in treatment. Another advantage of this natural vitrification of the cupreous pyrites is better, and purer liquors in copper sulphate than come from calcined ores, and thus besides producing superior precipitate also requires less waste of iron. Of course, there is a limit to the point when waste of iron and copper produced as in the case of the liquors from calcination are economical, and as in the case of the latter the liquors are allowed to leave the canals with some copper, but this can be economically obtained down to a much lower point than in the liquors from calcination. For further information as to the strength of solutions as these are very variable, and according to richness of the ore, and facilities to oxidate, special assays of each are required—thus we have from the mines from 100 grams per cubic metre up to 800 grams of copper in solution—but the natural leaching in dry weather is generally from 100 to 250 grams per cubic metre of liquor, and where the mines are not opened up much less—in fact, it is often observed in deep well-preserved masses—the water first met with in opening up these has no copper, but, as soon as a few days exposed, commences to form sulphates. The liquors obtained from the exposed ores in deposits have also variable quantities, but 2 kilograms per cubic metre can be easily maintained by the system of deposits described, and this upwards gives better results as to quality and consumption of iron than from 2 kilograms downwards, hence the richer the liquors in copper, the more economical in iron, &c. (For further information see *The Mining Journal*, 1893, page 1309. Mr. J. H. Collins on ores and liquors of Rio Tinto.)

(To be continued.)

**GROWTH OF THE ALUMINUM INDUSTRY.**—The efficiency of the electro-metallurgical methods now exclusively employed in the production of aluminum, is strikingly shown by the figures of the following tabulation, representing the product of the United States since 1882. The first impetus to the industry was given in 1886, when the electric furnace plant of the Cowles Brothers was fairly put in operation. In 1889, when the Pittsburgh Reduction Company entered the field with the Hall electrolytic process, another great advance in output was recorded; and the industry has since been steadily growing year after year.

Year.	Pounds.	Year.	Pounds.
1883	83	1889	47,468
1884	150	1890	61,281
1885	263	1891	150,050
1886	3,000	1892	259,885
1887	18,000	1893	339,629
1888	19,000	1894	550,000

The *Iron Age* estimates the American output of aluminum, in 1895, at \$50,000 lbs., and believes that the production of the present year will reach the imposing total of 6000 lbs. per day, or over 2,000,000 lbs.—*Journal of the Franklin Institute*.

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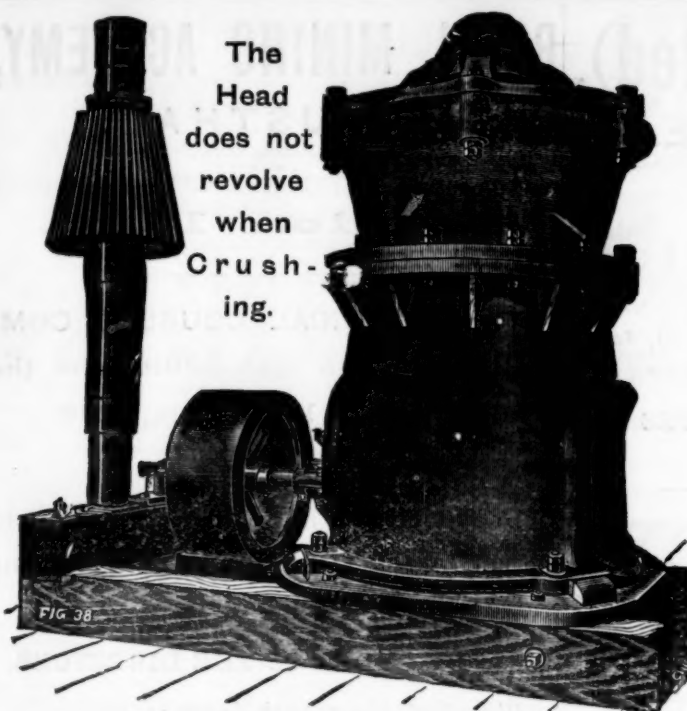
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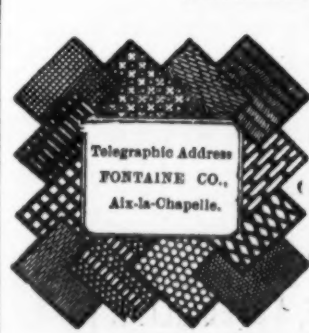
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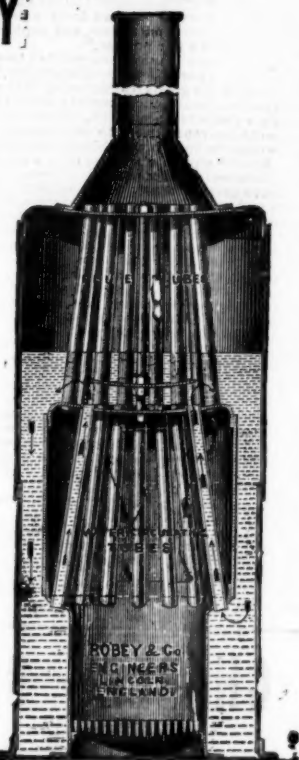
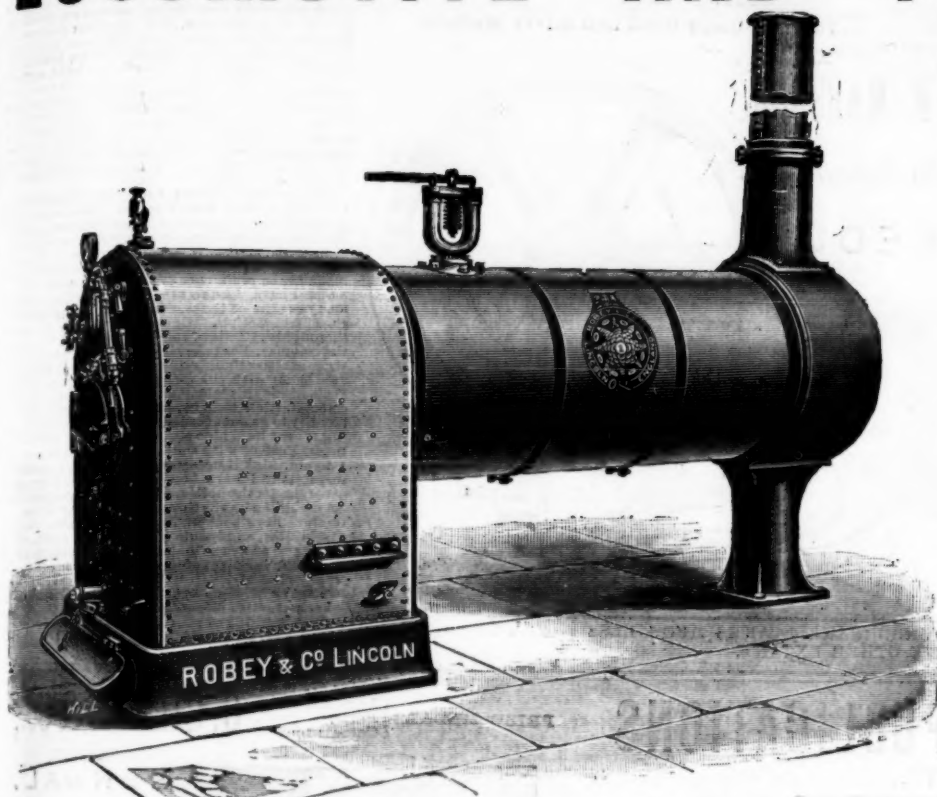
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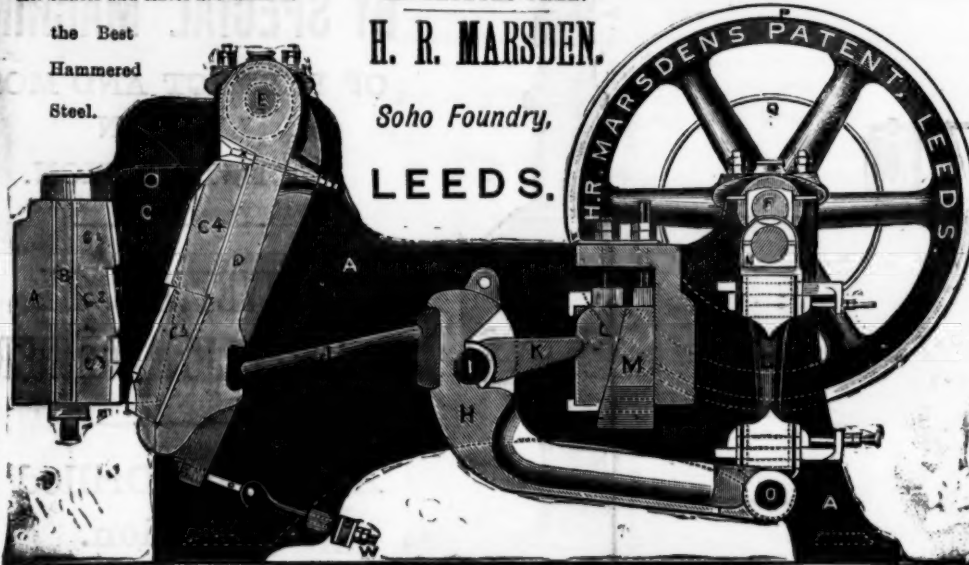
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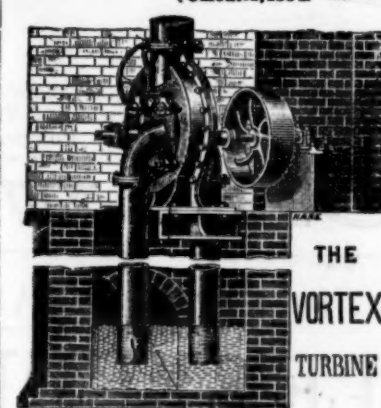
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